

## **ME349 Senior Design Project Ideas**

*When examining these project ideas, understand that current solutions may exist. This does not mean the project is a “bad” project, rather simply that a new, “more elegant” solution will be required. Teams will take care to not violate any existing patents in their designs.*

### **Adjustable Height Computer Desk**

Design a computer desk which may be quickly and adjusted in height. This would allow the user to stand and work at the computer for a period of time. Some people will spend more time working in the standing position than the sitting position and this device would provide the ability to choose.

### **Lawn Mower Work Stand**

Design a workstand that will raise and support a conventional lawnmower at a height of 24” to 48” (and any point in between). The stand must provide a stable work platform. It should allow the mower to be rotated 180 degrees. It should be portable, able to be setup and used by a single person and occupy no more than 4 square of floor space when stowed. Cost should be in the range of \$200.

### **2-Wheel Drive Bicycle**

Design a 2-wheel drive bicycle for use in x-treme sports. System must be robust and suitable for operation in varied environments. The design must provide all the standard functionality of a conventional bicycle. Cost must be appropriate for targeted customer base. (high potential for innovation here...new types of drive mechanisms, power differential between front and rear...)

### **Hybrid/Electric Bicycle**

Design a bicycle that may be propelled by conventional means (human power) and that alternately may be powered by an integral electric motor. Optimal electric power range should be 25 miles, with a potential top speed of 15 mph. It is assumed that such a vehicle could be used for delivery purposes in large urban areas. Therefore, costs should be less than \$1000. Consider the potential for using the pedals to recharge the battery. As a potential variant, could this be provided as a retrofit kit for existing bicycles.

## **Water Quality Indicator Buoy**

During the past few years, many beaches in the local tourist destination of Door County , Wisconsin were closed due high coliform bacteria counts in the water. The water quality test is a very basic one. It involves taking a water sample of specific size, adding a reactant, incubating the sample and finally reading the results. Design a buoy capable of sampling and testing water for coliform bacteria at the beach, and then conveying this information to the public. Testing for the organism Cryptosporidium (which was a source of water concerns in Milwaukee a couple of years ago) could be a possible additional feature. Cost should be suitable for municipal and state budgets.

\*This project has been studied in the past 2 years and previous design ideas exist. The group selecting this project would refine these ideas and attempt to fabricate a working prototype.

## **Basic Utility Vehicle For 3<sup>rd</sup> World Application**

Developing nations are frequently in need of transportation systems that will allow them to grow economically. This typically involves systems to move various types of freight. Due to the lack of paved roads and the low amount of financial resources available, conventional trucks are often not an option. This project will involve the design of a Basic Utility Vehicle (BUV) that meets a very specific set of specifications serving these needs. This project is actually a national student design competition and the specifications that you will use will be taken directly from that.

## **Wheelchair Attachment to Overcome Roadside Curb**

Conventional wheelchairs, both manual and powered, are difficult to maneuver over obstacles such as road curbs. A typically street curb is approximately 14” in height and can pose a severe obstruction. You are to design a device that may be retrofit to existing wheelchairs allowing them to climb a vertical obstacle the height of a conventional street curb. The device should fit multiple brands of both manual and power-assisted wheelchairs in order to increase market share. Manual retail approx. \$1000

## **Anti-vibration Jig Saw**

A standard ‘jig saw’ creates a fair amount of axial vibration due to the reciprocating nature of the blade. The purpose of this project is to design a jig saw where the vibratory forces are negated through kinematic and dynamic means. There is actually at least one very expensive version of this on the market but there are a number of approaches to this decent mechanical engineering challenge.

## **Range of Motion Exercise Machine for Individuals With Paraplegia**

There exist few exercise machines for individuals with paraplegia that simultaneously permit an upper body workout along with lower extremity range of motion exercise. For those in therapy, these workouts are usually accomplished through separate pieces of equipment that require the individual to be moved and repositioned. These machines typically cost in the neighborhood of \$10,000 each, making them prohibitively expensive for those who desire a rehabilitative machine for individual use. A solution should be appropriate for use by those individuals at T6-T7 paraplegia (at a minimum), and address the issues above.

## **“Stand-Up” Wheelchair**

Wheelchair bound persons have limited reach, making many day-to-day tasks (such as reaching an overhead cabinet) extremely difficult. Design a wheelchair (or a modification to existing chairs), which would allow the user to achieve a standing position while still in the chair. The chair would be appropriate only for those persons who have upper body mobility. The “stand-up” operation should be human-powered, in other words, the user will provide the power source.

## **Single Copy Newspaper Dispenser**

Newspaper machines operate by the honor system. You insert your coins and remove one paper from the stack within the box. In larger cities, some persons will remove all the papers within the box and resell them on the street. Design a newspaper box that will only dispense one copy at a time.

## **Bench Vise for Parts of Arbitrary Shape**

Ideal solution would not require changing of components.

## **Water Sensor for Boat Trailer**

Design and fabricate a simple, inexpensive device to provide feedback to persons launching boats as to when their trailer has reached a sufficient depth to float their craft.

## **Temporary Pickup Topper**

For many consumers, the pickup truck is their choice for hauling cargo. The open bed permits easy loading/unloading and large load capacity but no protection from the elements. Box covers and toppers provide cover and security, but severely limit load carrying capability and ease of access. Design a pickup box topper that can be installed and removed by one person. The idea is that the user can attach this topper when a covered box is desired, then remove and store when it is not. The topper should fit standard size boxes (short-box and long –box models are possible, but the solution should not be brand specific). The height of the topper should be at least equivalent to that of the cab. The topper should be able to withstand all expected loads including those associated with highway use. Cost should be less than \$1000.

## **Autonomous Dog Play Device**

Design a device which would allow a dog to engage in ball fetching game without the presence of a human.

## **Windshield Wiper that Prevents/Removes Ice Buildup**

## **Automated floor mop and dryer**

## **Solar-powered biodiesel processor**

## **Portable, lightweight solar generator to provide electricity in remote locations**

## **Human Powered Devices (Suitable for use in third world applications)**

- multi-grain thresher
- irrigation pump
- cement mixer

## **Student Defined Project**

A project team may present their own suggestion for a project. The project should have commercial application, be of a reasonable complexity and preferably involve mechanical and/or electro-mechanical systems. The final decision for acceptance of a project rests with the instructor.