Previous Biosystems Capstone Design Projects

1. **Freedom Concepts Inc.** – Peddle Redesign
   In Freedom Concepts foot pedal, which consists of a foot plate and an ankle harness, there are issues with the strength and the design of the harness holding down the operator's foot, which can lead to the operator attempting to, and succeeding in ripping the harness off of the foot plate. Freedom concepts would like a design for their pedal which improves the strength of the attachment between the ankle harness and the foot plate, as well as holds the operator's foot down more securely within the pedal. The design must be durable and easily adjustable to different foot sizes.

2. **City of Winnipeg Solid Waste Services** – Saskatchewan Landfill Slope
   Saskatchewan Landfill, AKA Garbage Hill, is the oldest of Winnipeg's 34 landfills. Opened in 1875, it is primarily incinerator ash waste, now covered and used as a city park. Although very stable due to the nature of the waste, the steep slopes with poor vegetative cover and aggressive recreational use has led to cap and slope erosion. Analyze and quantify sources of poor vegetation, slope, surface wear and erosion and devise a trial project from the Solid Waste Services' available materials that will be used to combat these issues.

3. **YMCA/YWCA of Manitoba** – Adjustable Stair System for Pool Entrance/Exit
   The YMCA-YWCA of Winnipeg has two pools in the South Branch facility with adjustable-depth floors. Individuals with mobility issues struggle with ladders built on the wall used to enter and exit the pool. Design an improved method of entry/exit to aid swimmers with mobility issues in getting in and out of the pool. The design must be lightweight, adjustable and portable so it may be moved between the two pools.

4. **SteelTech Inc.** – Design, Analysis, and Development of Biomass Fuels Storage System
   One of the main hurdles to overcome as a manufacturer of biomass boiler, is getting the fuel from the source to the burner in the boiler. It is recognized that there is a wide range of biomass available to burn and they all have unique characteristics such as size, shape, density etc. There is a need to deal with the condensation, freezing and decaying, of these fuels while in storage. Research and analyze the storage specifications for various biomass fuels available in Manitoba. Design a biomass storage unit that would be equipped to handle issues such as condensation, freezing, and decaying of several types of biomass fuel.
Previous Mechanical Capstone Design Projects

1. **Price – Automated Nozzle Seals**
   In the air flow test chamber, there are 5 nozzles of varying size. Currently, switching between nozzle tests requires manually sealing some of the nozzles, which becomes time consuming with several different tests a day. Design a device which is adaptable to sealing different sized nozzles. The design cannot damage the aluminum nozzles, must be able to handle the environmental conditions experienced in the test chamber, and must be automated to eliminate the manual switching of the nozzles.

2. **Boeing Winnipeg – Methods of Improving Ply Collation Times**
   Boeing Winnipeg cuts pre-impregnated plies on ultrasonic CNC cloth cutters in large, dynamically nested kits. Currently, each individually cut ply must be located in the nested kit and collated in the required order for layup. The collation times for large parts can be as much as 5 times as long as the CNC cloth cutting operation. Boeing Winnipeg would like the students to investigate options (manual and/or automated) to improve the cycle time of this operation. The selected options should be evaluated against non-recurring investment (capital and development costs), and labour and cycle time improvements.

3. **BOMImed – Automated Medical Device Dispensing System**
   BOMImed manufactures and distributes breathing circuits for anesthesia and respiratory applications. These circuits contain components such as corrugated tubing, filters, plastic fittings, and breathing bags. For common circuits sold, an automated line equipped with parts dispensers, conveyors, and a bagger are used to automatically package components together. BOMImed would like to increase the number of circuits produced on the automated line by introducing a machine to dispense 2L breathing bags (equipped with either hard or soft bushings).

4. **New Flyer (Aftermarket) – Driver Barrier Door**
   Design a hinged driver barrier door ("door") kit that is intended to protect the driver from - and generally discourage - petty assault and abuse by the public, without hindering the safe operation of the bus. The current door is cumbersome, heavy and visually unappealing. The door must offer a modular design to allow for various permutations; full door, half door and dutch door, to suit customer needs. The door shall install into the bus without welding, special tools or structural modifications to the bus.