**Project Title: Pedibus development**

**Sponsor**

Capitol City Pedibus

Ron Goldstein

**Needs Assessment**

Due Date: 27 Sept 2013

**Team 18**

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**Needs Assessment:**

There is a need to design and build a working road-ready pedibus prototype that will provide a safe form of transportation around town. At the same time, the design will serve as an entertainment and advertising console; and also deliver as an ease of future manufacturing and maintenance guidelines.

**Project Scope:**

 **Problem Statement:**

The purpose of this project is to build a full size working model of a pedibus, being powered by passengers via bicycle pedals. The end goal is to have a working model that is a base product for later manufacturing of pedibusses by the capitol city pedibus company. The final product may include a power storing inertia device as well as lights and digital advertising if the budget permits. The ideal design will be lightweight, yet sturdy, with smooth transition of power from the passenger pedals to the wheels. The success of this project will provide Tallahassee with affordable and pollution free means of transportation throughout the city.

 **Justification/Background:**

Europe has been using pedal powered vehicles for tours and pub crawls since about 1900, and only lately has the United States started to pick up on this growing trend. There are only a handful of Pedibus manufacturers in the United States and the sponsor for this project would like to bring up the Capitol City Pedibus company to a competitive level with the other front running pedibus manufacturing companies.

**Objectives:**

The objective of this project is to design a pedal powered multi passenger vehicle that can eventually be reproduced for sale. To accomplish this objective the project will include:

* Developing a number of price points relating to the size of the vehicle and number of passengers vs. material and construction costs so that a final frame size can be chosen based on cost. Time constraints will also be taken into account for the final frame size so that a working prototype can be built before the end of the 2013 spring semester.
* Picking a base frame structure for optimal strength and minimum weight.
* Designing a power drive system, including the linkages from the pedals to the drive shaft.
* Designing a steering and braking system, with minimal cost.
* Integration of a power generation system to charge a battery which powers vehicle lights.

All aspects of the design are to have safety and ease of maintenance as high priorities.

**Methodology:**

Before in depth design of the pedibus is undertaken, research on material costs and construction costs must be done so that the team can generate some estimates for the build cost of a pedibus based on its size and the number of pedaling stations. Once these estimates are available the team will contact the sponsor and consult with him on a general size and cost for the prototype. The time constraint of having a working prototype by spring 2013 will also be taken into consideration when choosing the size of the vehicle. After a general size has been chosen the following systems will need to be designed.

**Structural design:**

* Design a structural frame for the pedibus
* Examine stress concentration points with COMSOL, and tweak structure to optimize strength accordingly
* Design a “peddling station” where passengers sit and peddle. Design should account for ergonomic concerns and comfortable peddling
* Determine the spacing requirements and placement of each peddling station and driver station
* Draw up the design on pro-engineer to display as visual aid to the sponsor

**Steering/Breaking system design:**

* Decide on a steering method and design
* Decide on a breaking system
* Decide on type of brake to be used and with which components
* Decide on the need to include brake and signal lights to make the pedibus street legal

**Power system design:**

* Develop a method for taking the power input from passengers peddling and using it to move the pedibus
* Develop a motor assisted power system to assist in driving the pedibus uphill or when no passengers are present.
* Possibly developing a method for storing extra peddling power generated while the bus is at rest for later use.

All of these once these systems have been designed we can order parts and begin building a prototype.

**Constraints:**

* Starting budget of $2000.00
* Manufacturing costs must be low enough that it is cost effective to produce for sale
* The finished pedibus prototype must have a low enough total weight that it can be powered by one or two people peddling.
* The pedibus must be designed so that maintenance is simple and inexpensive
* All design efforts should be undertaken to make the pedibus street legal and safe to operate on public roads.

**Expected Results:**

The expected results is to have a working and ready to ride prototype by the end of April 2014. The development of this first prototype will provide information on the cost for different parts and features which will be provided to the sponsor. The pedibus prototype is expected to be efficient enough that one or two people could move the vehicle with light to moderate pedaling force. The team is hopeful that the prototype will be cost effective to reproduce, and easy to maintain.