PROJECT IDEA SUBMISSION

Team Contacts
- 1st person listed serves as the point of contact with Professor Nelson
- Initial team size may be from 1 to 6 members (all members must agree to have their name included)

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Note: Course policy prohibits projects involving drones, weapons, or significant safety risk.

PROJECT NAME
BringBackRollerBlades

PROJECT DESCRIPTION
The goal of this project is to redesign an existing set of inline skates. This will aim to minimize vibrations from the wheel base to the lower body to reduce back injuries and foot injuries. A more compact frame with a set of shocks / dampers will be incorporated to the original concept.

WHAT IS THE PROBLEM YOU ARE TRYING TO SOLVE?
Being an avid fan of inline skates and using them to commute from day to day I have noticed several problems with the existing design of inline skates. Back pain and incorrect posture is one the biggest issues when it comes to rollerblading. This gets worse over time and is a major drawback when it comes to using these over long time periods. Another issue directly related to this is maintaining the wheels. These tend to
wear out relatively quickly over time causing the user to exert more force which in turn increases the stress on the lower body, etc.

EXPLAIN THE PHYSICS OF THE PROBLEM. Include Free-body diagrams or other sketches as necessary.

When it comes to inline skates and posture the main component is controlling the vibrations created by bumps, etc. The wheels used will need to be able to absorb a considerable amount of force without deforming while maintaining a small contact area with the surface to ensure speed.

WHY IS IT A PROBLEM? (WHY IS IT WORTH SOLVING?)

Back pain and excessive maintenance of worn out wheel is a constant problem encountered by countless inline skaters. It is one of the main reasons why the sport has died down today and finding a solution to these basic issues could be revolutionary.

https://www.livestrong.com/article/274834-rollerblading-back-pain/

DESCRIPTION OF YOUR PROPOSED SOLUTION(S). Describe the functional requirements for the final product. Include preliminary sketches of the initial concepts, and explain how they are innovative.

Redesigning the wheel base which connects the inline skates to the shoe frame. Explore the possibility of using different materials of wheels and the possibility of how shock absorbers could be incorporated in the existing model. Possibly improving the shape of the main shoe to be more aerodynamic and comfortable.
EXPLAIN HOW THE PROTOTYPE WILL BE BUILT & TESTED.

A set of different wheels will be outsourced and tested for their elastic deformation, etc. This will quantify the wear and absorption properties. The base which holds these wheels inline will be redesigned and manufactured (this may mean altering an existing frame) to incorporate dampers/shock absorbers. These will be used to reduce the level of vibrations within the shoe. Lastly, an analysis will need to be done of the benefit of increasing the contact area of the inline wheels with the surface vs increased frictional forces. The best way to test these is through a root cause analysis of the individual components of the inline skate.

WHAT ENGINEERING PRINCIPLES WILL BE USED ON THE PROJECT AND HOW?

ME 274 – Springs and dampers
ME 352 – Machine Design
ME 263 – Design and Prototype
ME 363 – Manufacturing / Analyzing

Overall, this project will look at how the linkages inside the roller blades interact with different surfaces which produce vibrations throughout the body, specifically the lower back and the feet.

MARKET ANALYSIS: Who are the target customers and how will they benefit from your proposed product?

Professional athletes – less injuries and better performance.
Every day avid skaters (like myself) – faster and more efficient means of transportation.
Roller blade / sporting companies – less maintenance means more sales and profit.

BENCHMARK RESEARCH: What solutions exist today and how is your proposed product solving the problem uniquely and better? Describe relevant patents and commercial products including their functional performance and cost.

Removable roller blades exist today but these do not tackle the issue of back injuries. Considering the wheel base is not rigidly connected to the shoe, these actually increase vibrations to the feet as well.

https://www.amazon.com/dp/B016CCWD6S/ref=sspda_dk_detail_3?psc=1&pd_rd_i=B016CCWD6S&pd_rd_wg=0AfMo&pd_rd_r=BDSGZMP2KF92XQSSiWX8&pd_rd_w=9Qrm3

Different variants of roller blades exist which have a different hardness of the wheels used. None of these have dampers/shocks. These need to be replaced after every 6 weeks.
HOW WILL THE SOLUTION CREATE BUSINESS AND/OR SOCIETY VALUE?

Rollerblading burns as much calories as running and is an efficient way to commute
It used to be a very popular activity in the early 1990’s and the market has already been proven. With a few design changes and a lot of hard work these can take the world by storm again.

Save the file with the following nomenclature: project name - point of contact full name.docx

Email completed form to Professor Nelson at tnelson1@purdue.edu to request project approval.