As a mountain biker myself I have recognized a deficiency in cross country dual suspension mountain bikes. Every year manufacturers try new methods to attempt to solve the performance and weight problems in current designs and they fail in one or many ways. These flaws in design lead me to select my senior project. The objectives of this project was to optimize the rear suspension system, select materials, manufacture a prototype, acquire patent, and eventually market the new design that satisfies all the criteria not met by the bikes in the market today.

Competing Designs:
After characterizing the optimal performance criteria I had to evaluate competing designs. I performed this evaluation using Working Model which allowed me to quickly and accurately assess the path of motion of the rear axel on many different designs. Below are three of the best and highest selling competing designs and their Working Model path traces. One can see that none of these designs produces linear motion.

Possible Designs:
In order to achieve a truly new and different design that would be able to fulfill all of the design requirements I began by investigating different types of linkages. The most important part of this search was finding a linkage that would produce linear motion. After looking at many possibilities I was able to select one based on how well it could be adapted to a bicycles necessary geometry. Below is a representation of my initial analysis of the linkage as well as a diagram showing how it could be adapted to a bicycle’s geometry.

Abstract:
As a mountain biker myself I have recognized a deficiency in cross country dual suspension mountain bikes. Every year manufactures try new methods to attempt to solve the performance and weight problems in current designs and they fail in one or many ways. These flaws in design lead me to select my senior project. The objectives of this project was to optimize the rear suspension system, select materials, manufacture a prototype, acquire patent, and eventually market the new design that satisfies all the criteria not met by the bikes in the market today.

Optimal Design Characteristics:
- Eliminate pedal bob
- Eliminate chain slip and stick
- Linear motion of rear wheel for optimal response
- Minimize shock rotation which causes misalignment and increased stresses within the shock

Design Implementation:
In order to speed up progress on manufacture of the frame, as well as quality, Easton Tubing was selected. In addition to this I also selected a linear slide assembly for the difficult task of inhibiting the shocks path to linear motion. With these pre fabricated parts I was then able to proceed by specifying the remaining parts of the design to the machine shop for assembly and fabrication. A shock and bearings have also been selected and ordered.

Possible Designs:
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Final Design:
- No pedal bob
- No chain slip or stick
- Linear motion
- No rotation of shock element

Current Progress & Future Work
Currently I have just completed the final drawings of the frame for the machine shop. I will also be receiving the shock I selected as well as the bearings sometime this week for the final assembly. Once the prototype is completely fabricated I hope to investigate the possibility of marketing the concept to outside companies and completely secure a patent.

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