Self Loading Kayak Rack

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Abstract
The loading of a kayak onto the roof rack of an SUV can be difficult if done alone. Due to the size and weight of the kayak it is generally hard to maneuver and avoid damage of the vehicle and other equipment. Our design of a self loading kayak rack uses an electric winch, as well as an integrated rolling system to load the kayak at a push of a button which eliminates strain and possible damage.

Design Development
This project was selected in order to fulfill the customer need of the individuals of the team. The Yakima Showboat ® roof rack was the benchmark for our original design. Problems with current roof racks inspired the integration of new features, while maintaining a user friendly interface. Since the design is an automotive feature, safety was a vital concern. The design was made to be collapsible, making it sleek and convenient to leave on an automobile when not in use. A winch was incorporated into the rack to allow for automated loading of the kayak. Through all of these mentioned factors we designed what we consider the best solution, “The Individual” kayak roof rack system.

Engineering Challenges
Many engineering challenges were encountered during the design of this kayak rack.
- Locking Mechanism - A dual spring load locking system that allows both sides to lock
- Placement of winch - The winch was placed towards the center to avoid safety issues.
- Rolling System - The back rolling system contains angled rubber wheels to help prevent slippage and assist in loading the kayak.

Analysis
Through trials of finite element analysis our team reconstructed our design to have minimal displacement of all crucial parts. The entire rack system is capable of withstanding loads more than three times the weight of the heaviest kayak with gear.

Customer Survey
A customer survey was conducted to verify the need for this new product. The survey was given to a local fraternity as well as family and friends. The results indicated that the majority of kayakers drive SUVs and there is in fact a need for a self loading kayak rack system.

Acknowledgements
Stephen Laguette, Nelson Bednersh, AJ from (SB Outfitters)

References
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