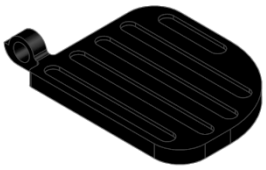
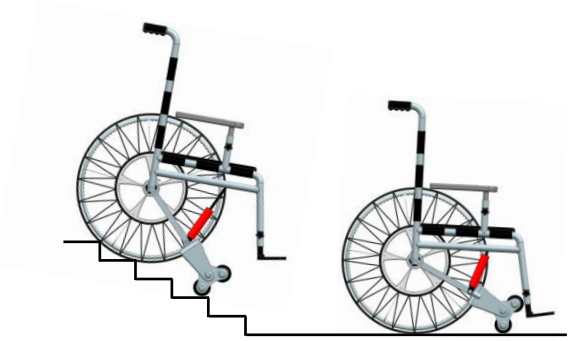
Demonstration of Work by Travis Kohlbeck

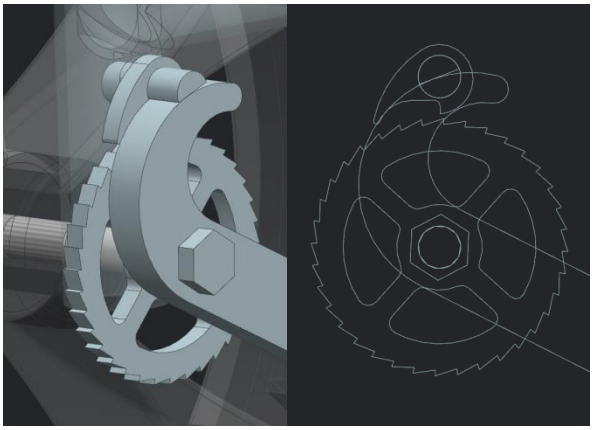
STAIR CLIMBING WHEELCHAIR

- Designed all features excluding front and rear wheels.
- Features adjustable footplates and arm rests.
- Examples of sub-assembly parts can be seen below. From left to right: wheelchair frame, footplate, ergonomic handle, adjustment knob.



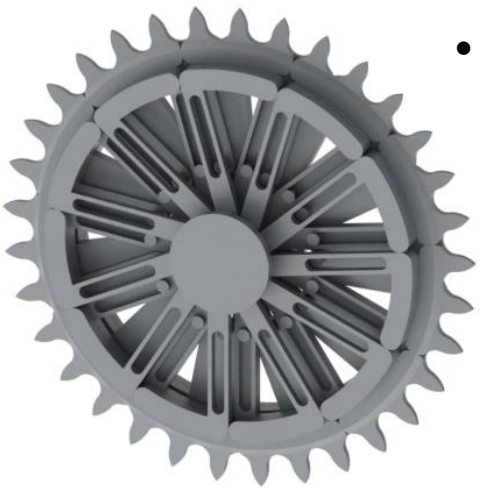
User approaches staircase backwards and lifts themselves up with the rear wheels, which slightly deform to improve traction. Piston (seen in red) pushes front wheels down to maintain contact with ground.



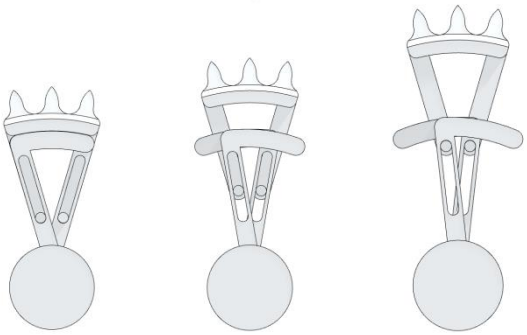


As the front-wheel arm lowers to maintain contact, a pawl, connected to a vertical slot in the frame, slowly slides down the curved end of the arm, engaging a ratchet at the necessary angle. This allows users to let go of the wheels while climbing.

BICYCLE TRANSMISSION

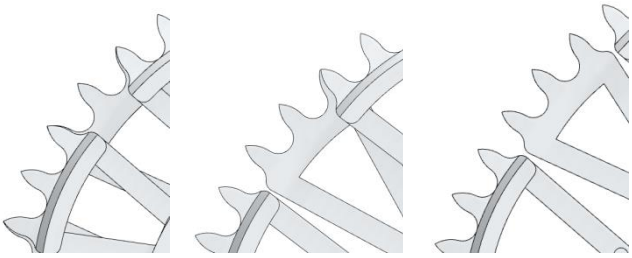


- Personal project started during last semester, currently a work-in-progress.
  - Sprocket expands or contracts based on speed with which it's rotated.
    - Composed of twenty-two "fins" which are able to move independently of one another.
  - Fins expand under centrifugal "force" and retract by means of a spring mechanism.



Fins ride along two arms, which slide closer together as they contract. The spring mechanism resists this contraction.

As the chain comes in contact with fins, teeth between fins will align, forming either a larger or smaller sprocket diameter at that point.

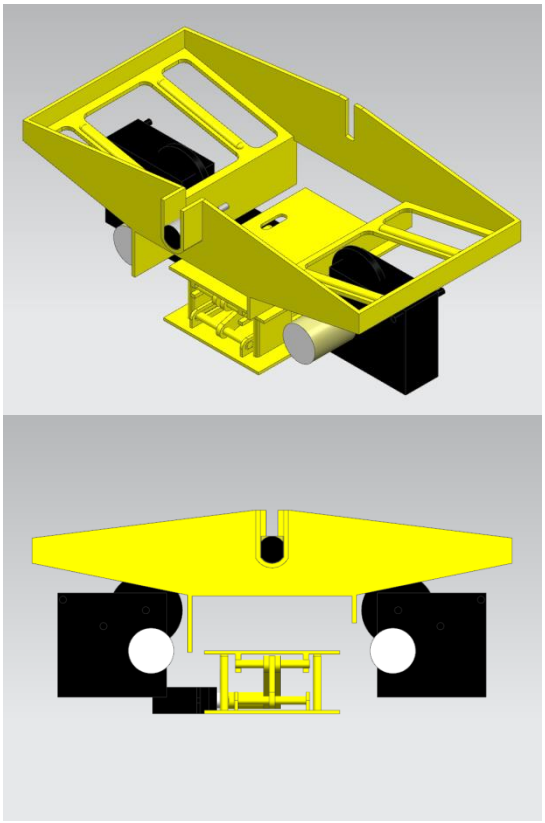


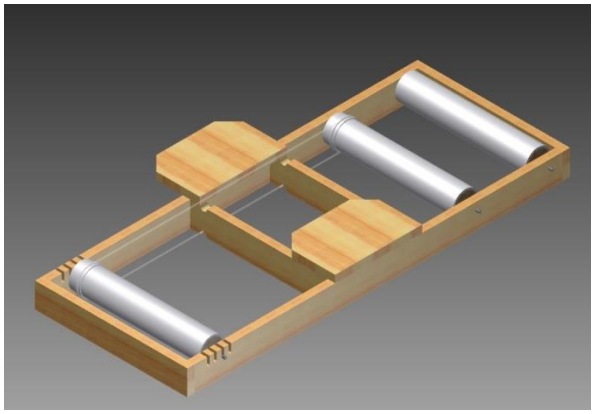
The rear sprocket, continued physical calculations, and a ratcheting mechanism for the crank set still remain to be completed.

MISCELLANEOUS

Created plastic covers for senior design project (an automatic poker card dealer). Polystyrene plastic sheets were formed over wooden molds using a vacuum former. Cuts were made with a band saw, circular saw and Dremel.

Designed automatic card shuffler for senior design team (excluded due to time limitations). Raised lift puts cards in contact with top axle, which splits deck to left and right banks. Two large black motors alternate placing cards back onto the center lift, which at this point would be again lowered. This sequence is repeated until the deck is sufficiently shuffled, at which point a rear wall would push the deck into the (completed) poker card dealer.





Constructed bicycle roller out of wood, PVC pipes and metal rods with two friends in the fall of 2011. Created model to finalize dimensions and obtain list of parts.