# Jumping Dolphin Automata

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# 1 Executive Summary

The automata I created features a pair of dolphins jumping through waves when a hand crank is turned. I chose dolphins as my primary focus since they remind me of the warm, sunny beaches at home and the joy of seeing dolphins in the aquarium as a kid.

This automata features the use of lasercut gears and a 4 bar linkage arranged in a crank-rocker orientation in order to achieve an elliptical-like path from a continuously rotating linkage.

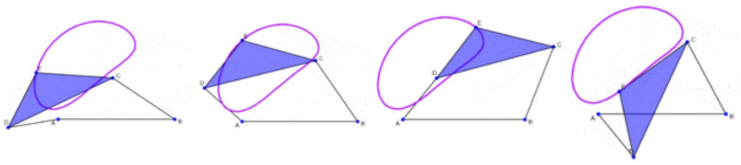


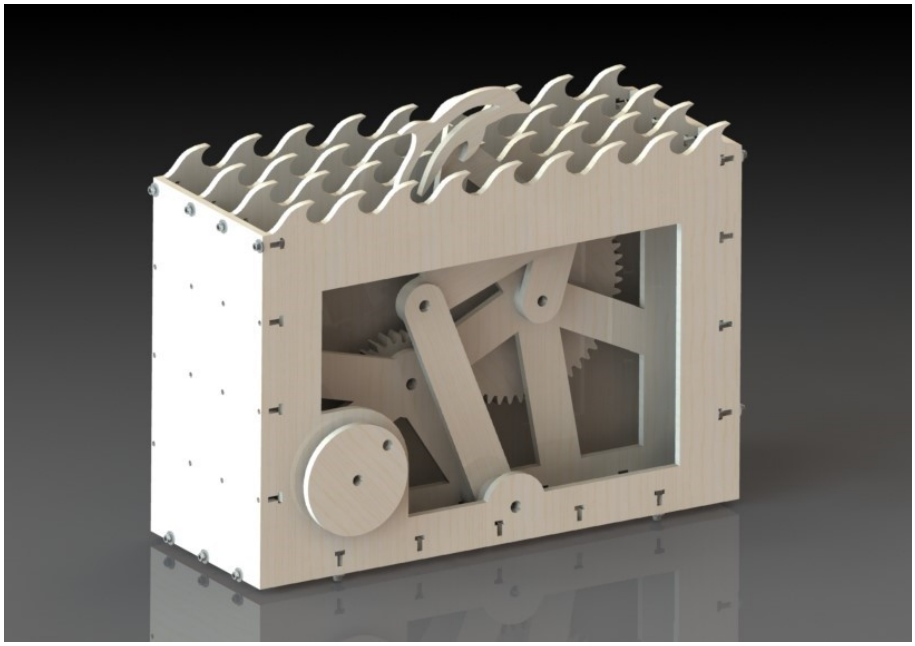
Figure 1: Linkage Concept

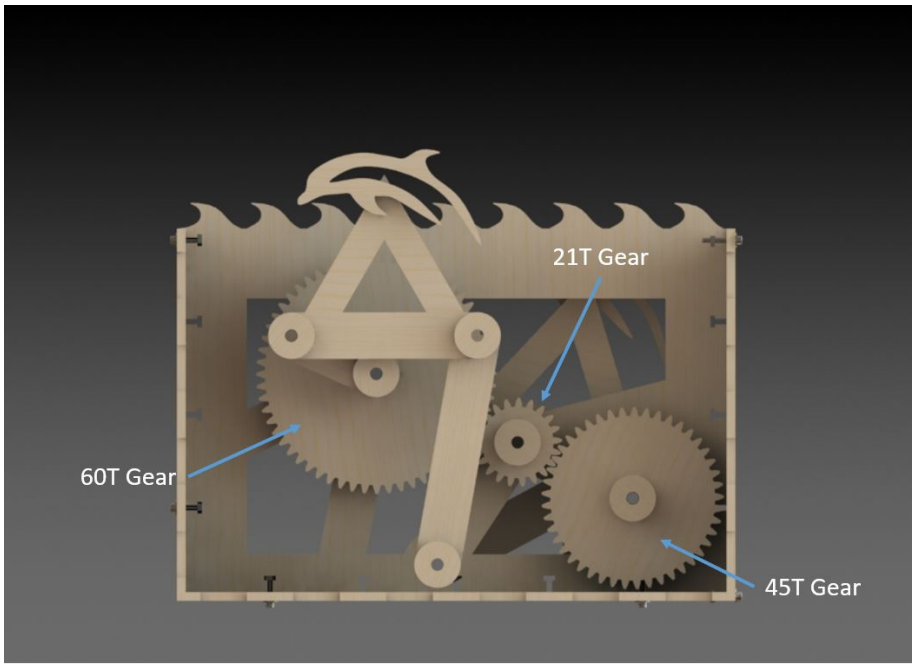
Gears were used in this automata in order to transfer the circular motion from the hand crank to the gear driving the motion of the dolphins.

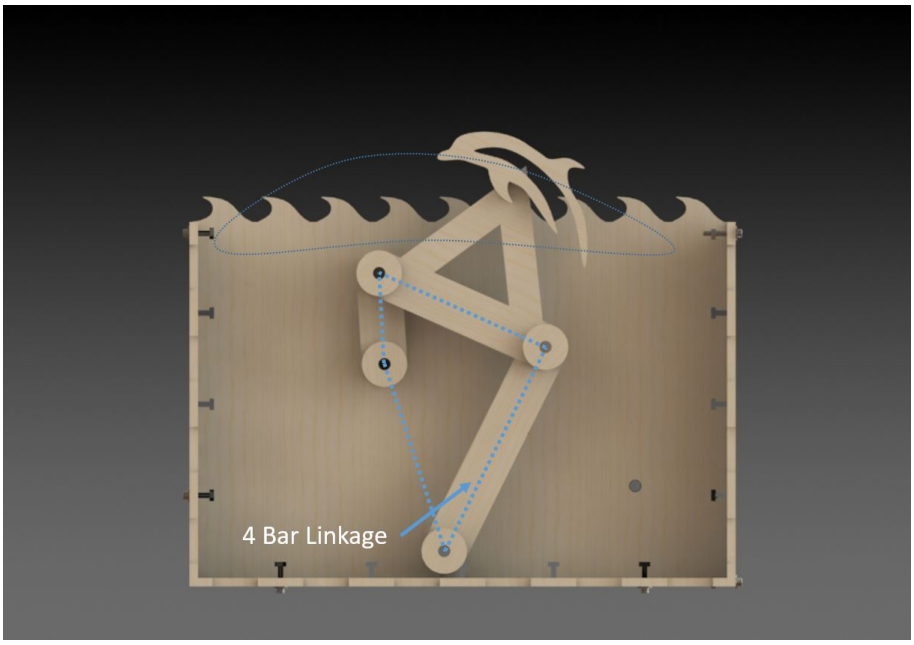
**Gears Used:**

- 60T 12DP Spur Gear - Used for driving main linkage to move dolphins
- 45T 12DP Spur Gear - Connected to the hand crank
- 21T 12DP Spur Gear - Used to make hand crank gear spin in the same direction as dolphin gear. Also transfers the rotational movement over the distance between the crank and the dolphins

## 2 SolidWorks Model






4 Bar Linkage

# 3 Physical Assembly

# 4 Videos

- https://youtu.be/1TtiIfQhoLc - CAD animation
- https://youtu.be/MdBrAFgk-Yg - Working assembly

# 5 Reflection

I learned a lot while making this automata. In terms of Solidworks things I learned included:

- Using gear mates in a project
- Using global variables to make revisions to CAD easier
- Using Sketch Blocks to avoid re-doing a sketch over and over

Other miscellaneous things I learned included:

- Paying attention to material usage - I didn't pay attention here and it worked out alright since there was extra, but this could have ended really badly
- Using spacers really helps reduce friction
- Lasercut holes are actually bigger than they're CADded to be (not like this has been said many times already)
- Lasercut gears seem to work alright for low load applications as long as careful thought is put into reducing friction
- Wood glue is not removable when you want it to be, it can break dowels
- Wood glue is not strong when you want it to be, it will break under low loads
- If it isn't broken, don't fix it. If it is broken, don't worry about breaking it more to fix it.
- Don't give up (but sleep is important)

Overall, this project turned out really nicely and it works much better than I expected it to work. Although there were some rough patches in getting it to work, I'm happy with the overall outcome of this project.