Centrifugal drive

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Summary

The possible use of centrifugal force to create a motion.

Table of contents

1. Introduction

The possible use of centrifugal force to create a motion.

Showcase of prototypes that make use of this principe.

2. Basic principle

The centrifugal force is used to propel the device producing this forces.

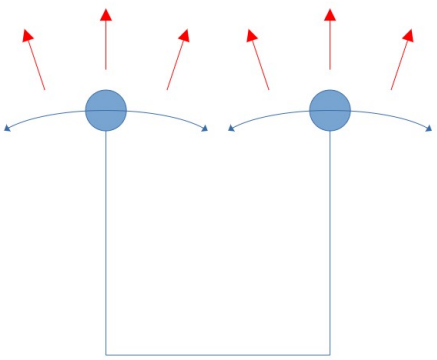
A) By one way directed force.

B) By opposite centrifugal forces with different strength.

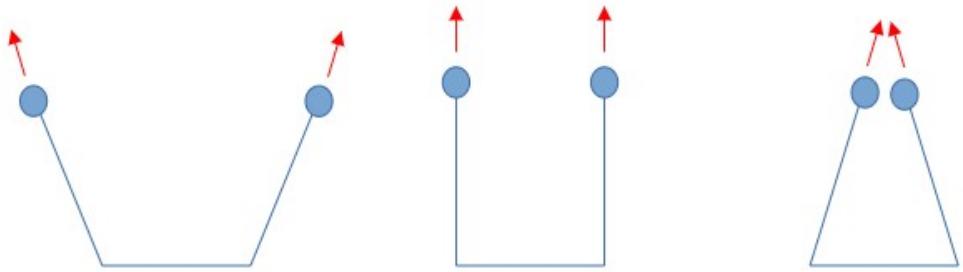
3. One way directed force prototype

Works by generation of centrifugal force not on a full circle, but only on a circle section.

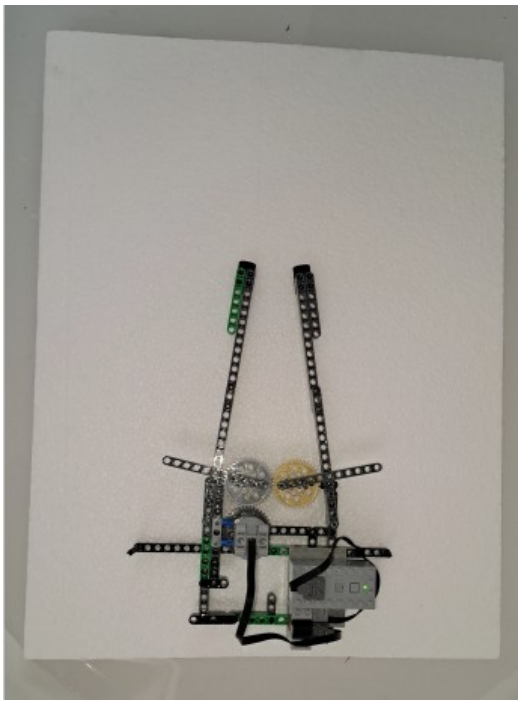
The prototype uses two arms with opposite movements to stabilize it.

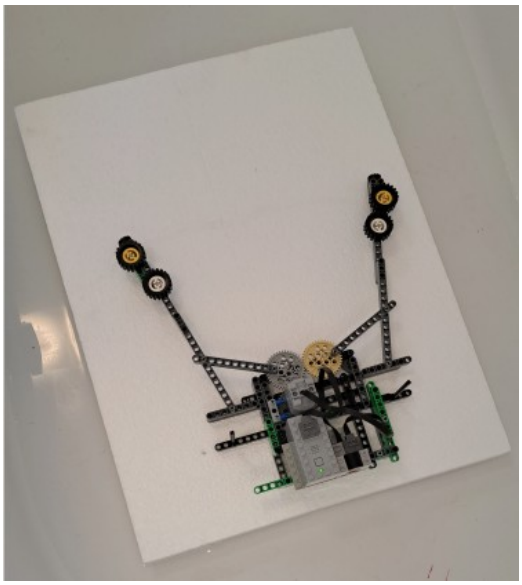


Visualization of the movements of the arms.



Prototype was build out of bricks and placed on a styrofoam board.





The test environment was a bath tube with water.
When the prototype was started it also started moving.
The prototype was vibrating / shaking from the inertia mass of the arms and the hard stop of the arms at the turning points.
So it can not entirely ruled out, that other forces other than centrifugal force has contribute to the moment.

4. Opposite centrifugal forces with different strength prototype

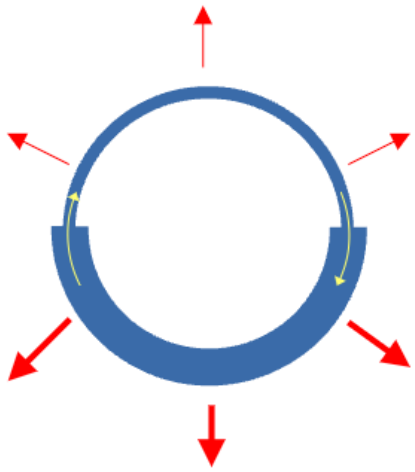
Works by creation of a spinning ring, where one half of the ring produces a lower centrifugal force than the other half of the ring.

This can be achieved by exploitation of the centrifugal force formula.

$$F = mv^2/r$$

Since v is squared, the velocity has a much higher impact on the force than the mass.

The needed change in mass and velocity is reached by using water for the ring. Each half of the ring uses a different sized tubing.



Example for mass and velocity changes:

Base: m=2 v=2 r = 1

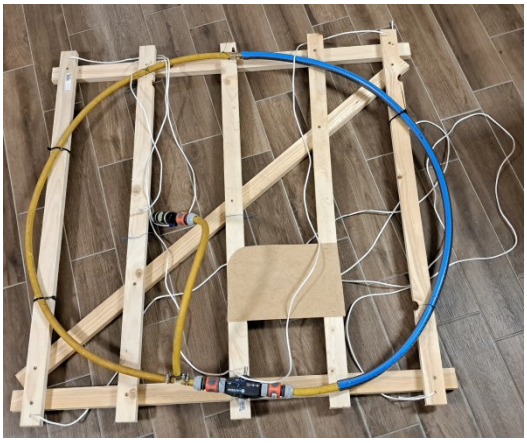
$$F=2*2^2/1=8$$

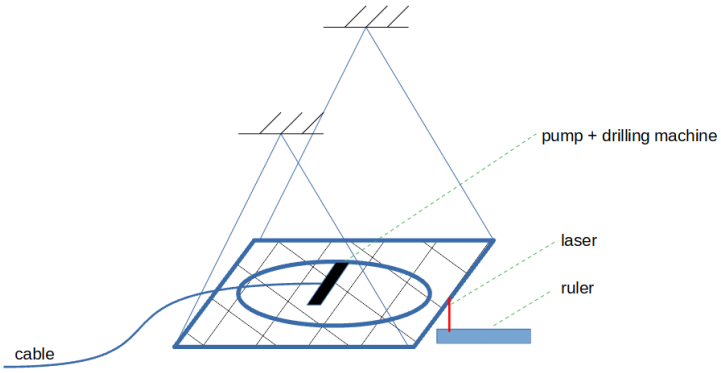
Volume gets halved, so mass will also be half.
Velocity need to be doubled[1], so that total flow will be the same as in the base:

$$F=1*4^2/1=16$$

Volume gets doubled, so mass will also be double.
Velocity need to be halved, so that total flow will be the same as in the base:

$$F=4*1^2/1=4$$



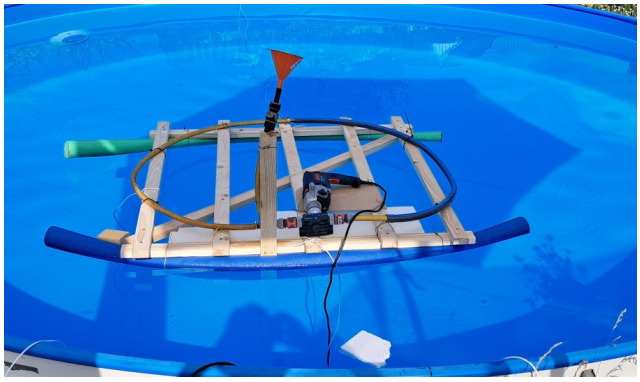


The prototype was hung to the ceiling. The ring is made out of different size garden hose. Powered by a small drilling machine driving a garden pump. Also attached was the laser pointer pointing down to a ruler. Arranged, so that the pointer pointing to zero on a ruler when in rest.

When plugged in, the prototype started swinging in direction of the larger hose. On the ruler between 0 and 4mm. Never going below zero. When unplugged it came again to rest at the zero mark.

For a real drive at least two of them needs to be combined to counter rotary motion of water flow and drill.

Testing the prototype in a pool confirmed this result further. For the start of the drill the prototype was held in place to counter the rotational forces.
Then when let go started moving in the direction of the larger hose



5. Other well known examples of this effect

5.1 Washing machine / spin-dryer

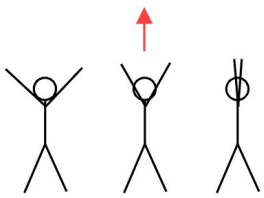
When the wight in the drum is not distribute evenly, the drum starts to wobble.
This wobbling drags the attached motor also along.
Since it is spinning the centrifugal force is distribute evenly over a full circle. And no movement occurs.

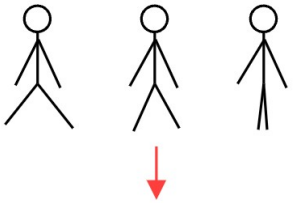
5.2 Hammer throwing

When a hammer thrower throws its hammer it is flying straight away.
This also happen when only a partial rotation is done. Like a half or a quarter circle.

6. Implications for astronauts

So by opening and closing of the arms or legs, the astronaut should be able to start moving in the appropriate direction.
There is also the question, if arms or legs can be moved fast enough to accomplish this.





7. Links

https://github.com/uwschube/zedrive

https://www.sensorsone.com/volume-flow-and-area-to-flow-velocity-calculator/ [1]