ROBOTICS CLUB

SCIENCE AND TECHNOLOGY COUNCIL
IIT KANPUR

Robotics Club IITKanpur

Robotics Club Winter Camp 2019

Unlock The Roboticist Within!

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Designing and Manufacturing

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What is Design?

- Design is essentially a Decision Making process
- For every problem, we need to Design a solution
- Basically, design answers the ‘HOW?’ part of any process.

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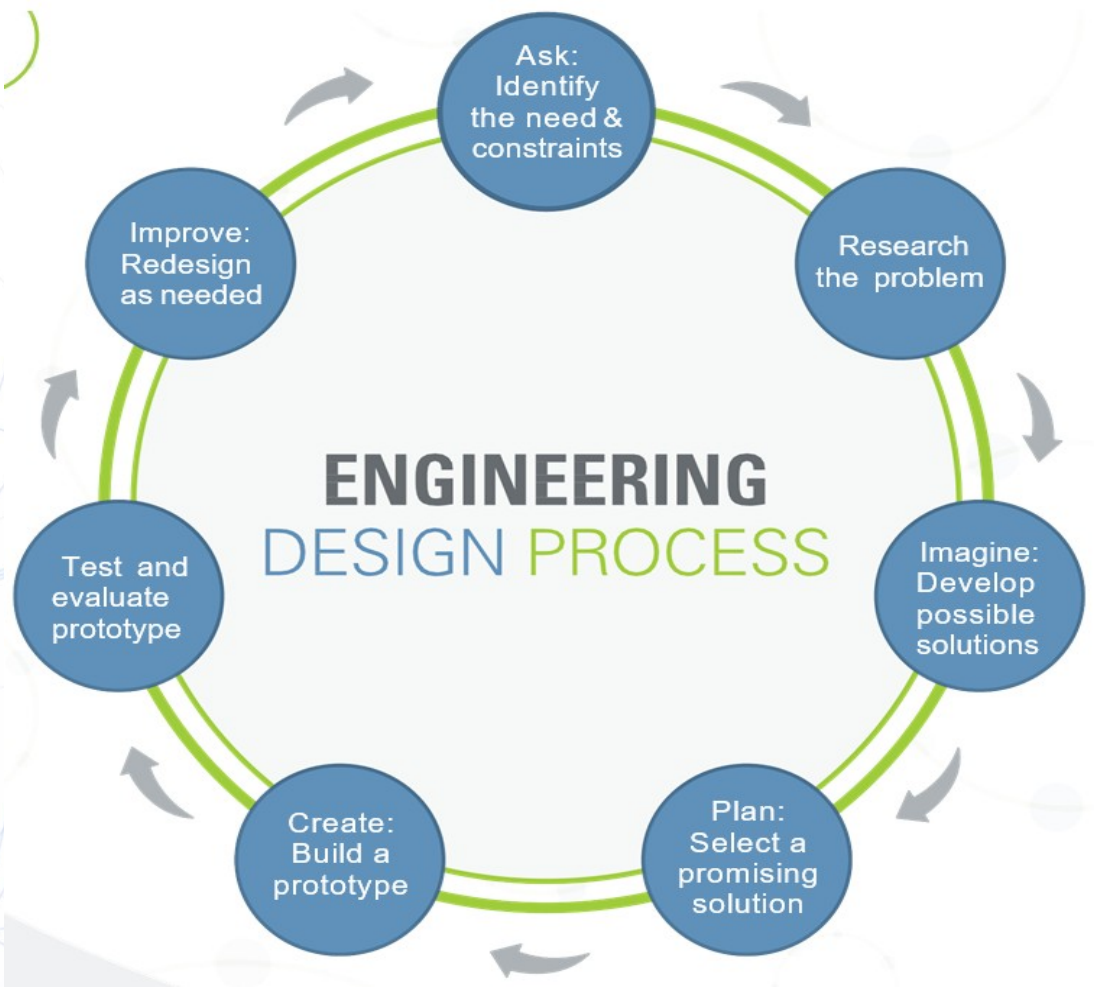

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Why Design?

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- Minimizing Iterations for improvement.
- Lesser no of iterations ensure the minimal use of raw materials.
- Efficient designing procedures can also helps to reduce flaws in the final product.

Different persons working on a project might have different views/thoughts on how a task should be done, so a common pre-established plan is very necessary.

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Consequences of Bad Designing

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How to Improve your Designs

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- No Design is ever ‘Perfect’
- Every existing design can be improved, we just lack the motivation, or the inspiration to do it.
  Let’s see that with an example.

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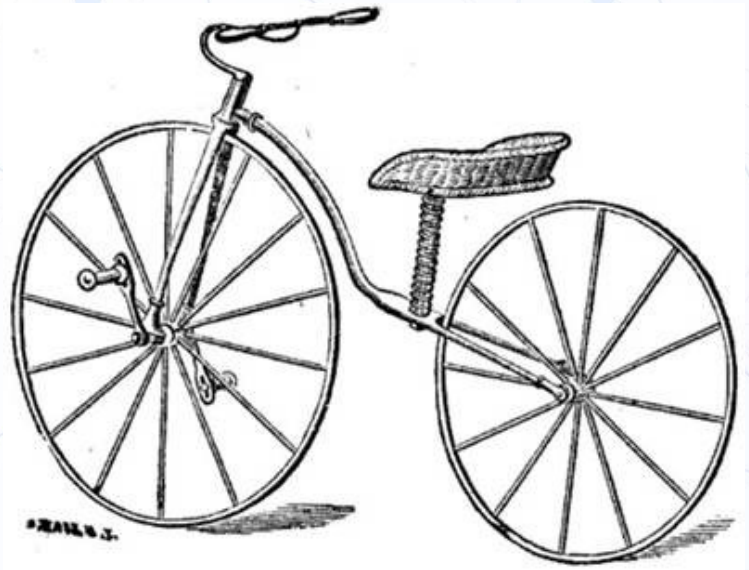
The Bicycle



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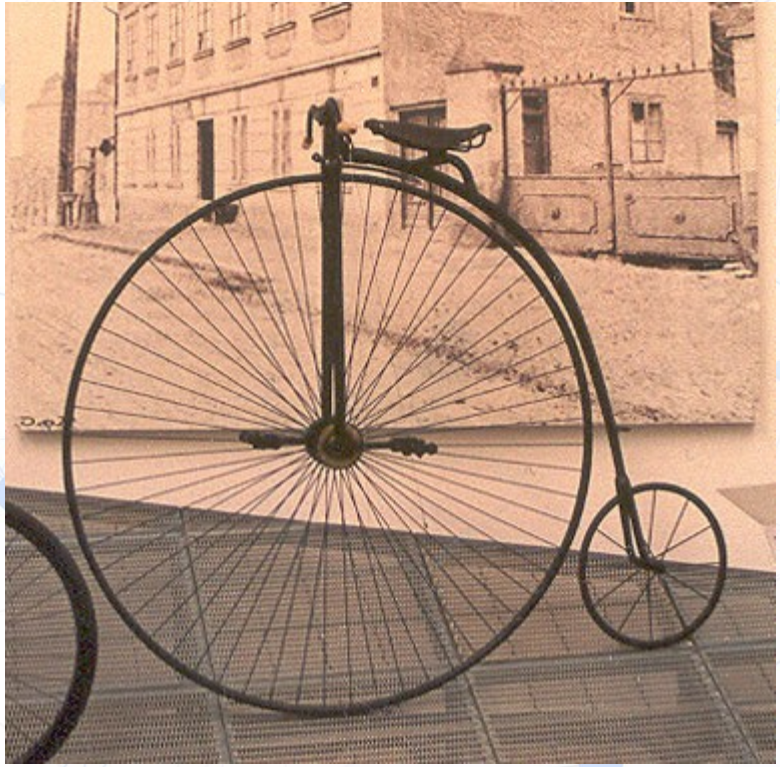

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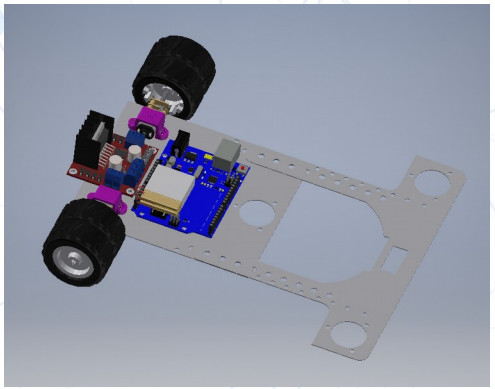
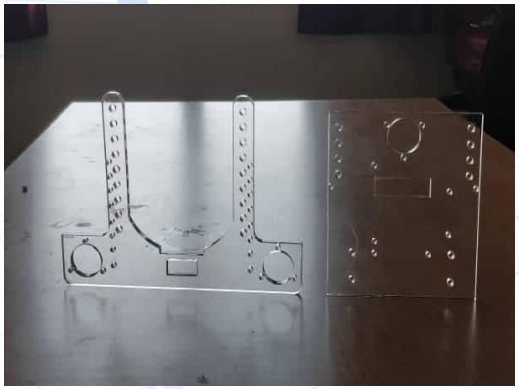
Robotics Club Summer Project

Features:

- Low height
- Adjustable Length

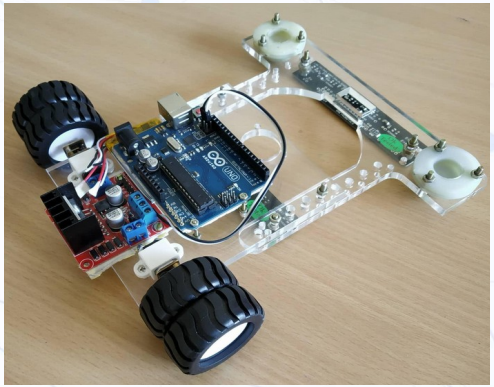


Designing



Manufacturing

- Acrylic sheet
- Laser cutting



Assembled Bot

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What existing design can you improve?

Try to think from your surroundings, it can be anything

Just be creative!!

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Mechanism

Mechanisms is a piece of a larger process or mechanical system.

It is used to transform given motion/forces into a desired set of output motions/forces.

Motions

- Rotary Motion
- Linear Motion
- Oscillatory / Reciprocating Motion

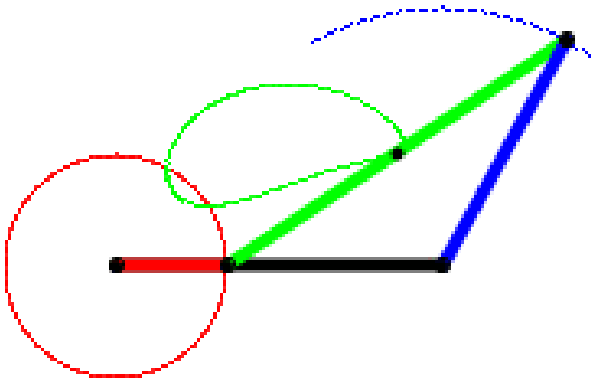
Degree of Freedom

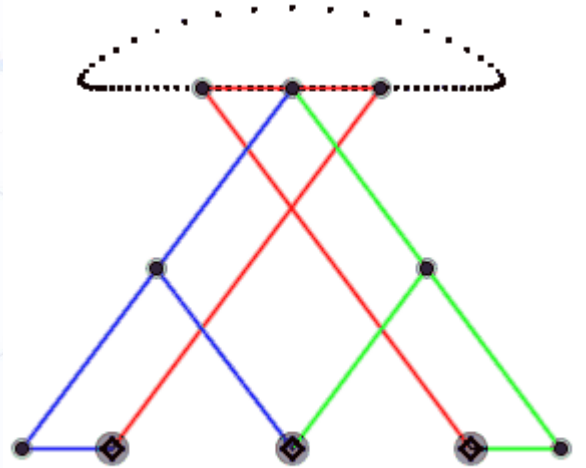
The number of motions required to provide the desired output.

Basically it is equal to the number of actuators used

Some Common Mechanisms

Linkages





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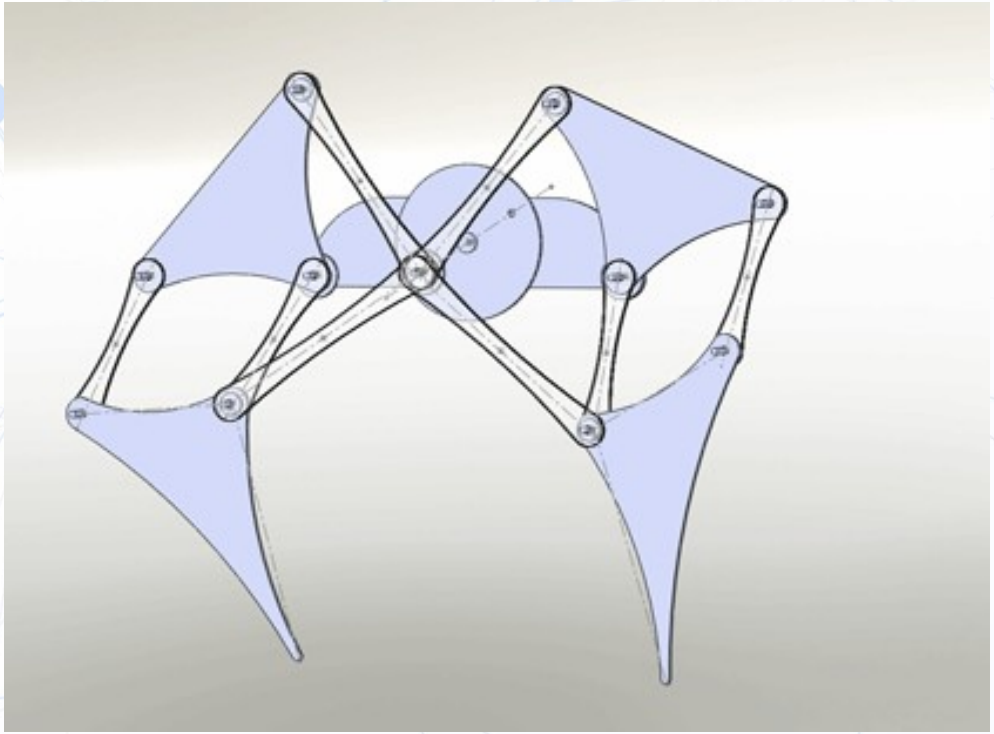
Walking Machine



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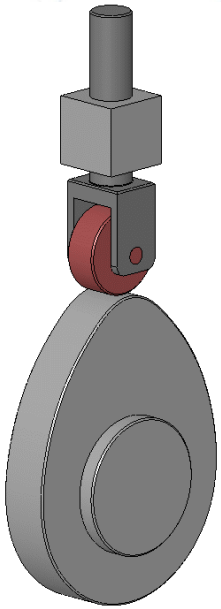
CAMs



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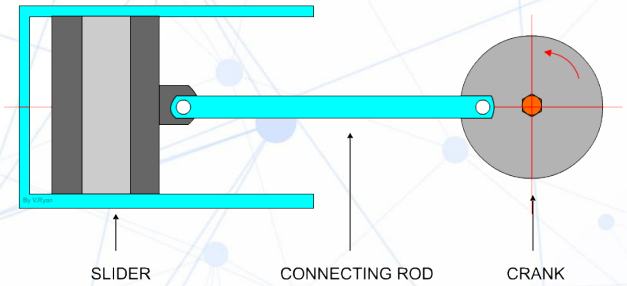
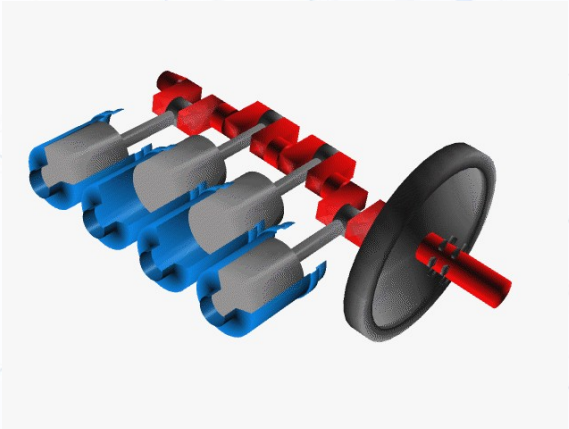
Crank Slider





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Radial Engine

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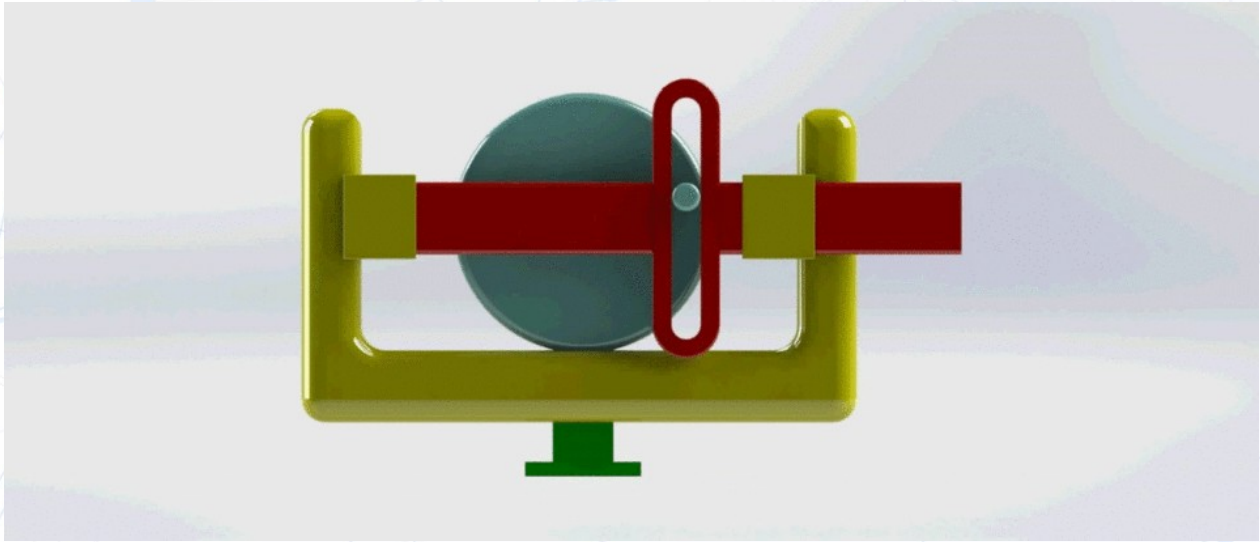
Scotch Yoke



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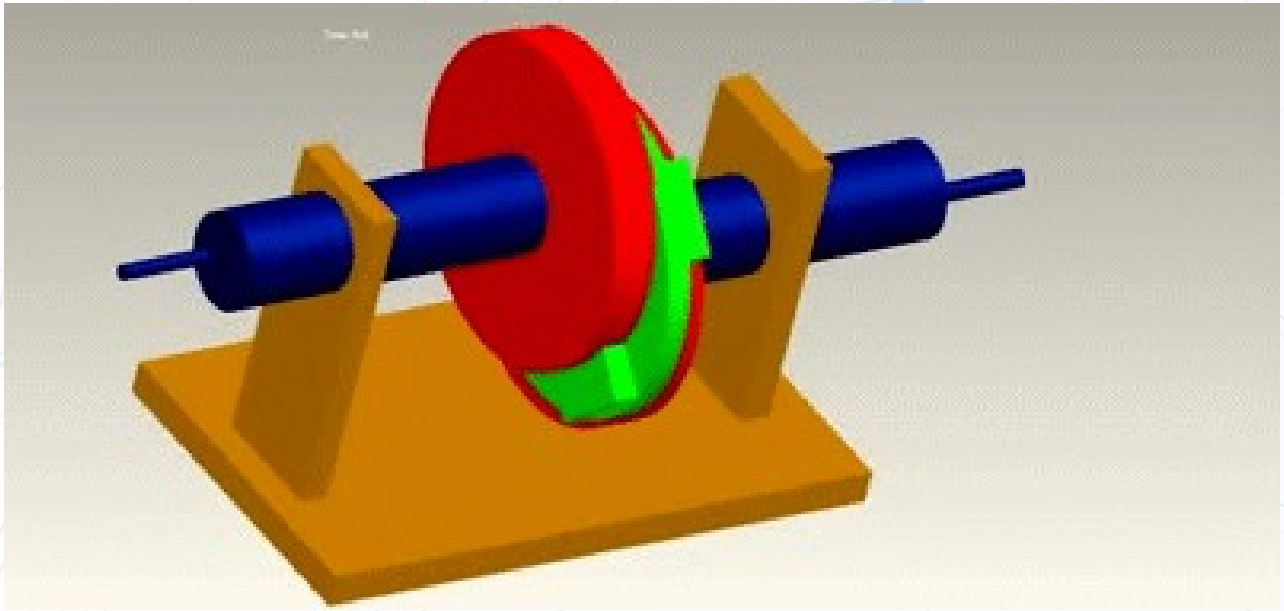
Oldham’s Coupler



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Lead Screw Mechanism

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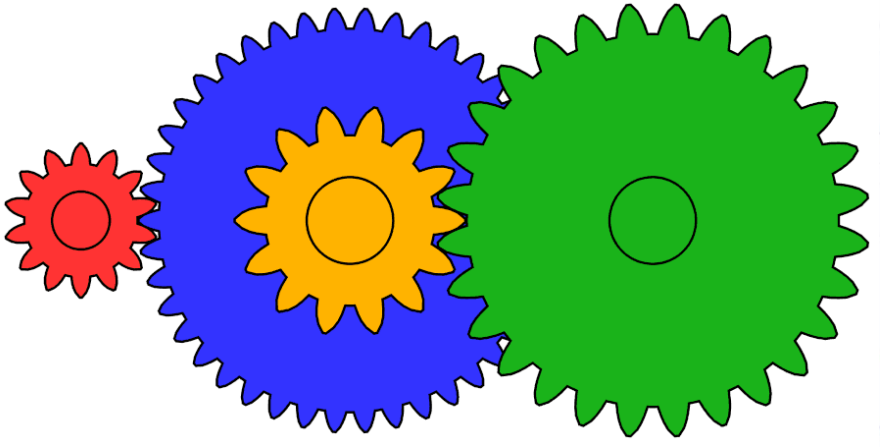
Gear Mechanisms

Gears are toothed cylindrical or conical wheels used for power transmission with or without speed reduction

Spur Gears



Bevel Gears

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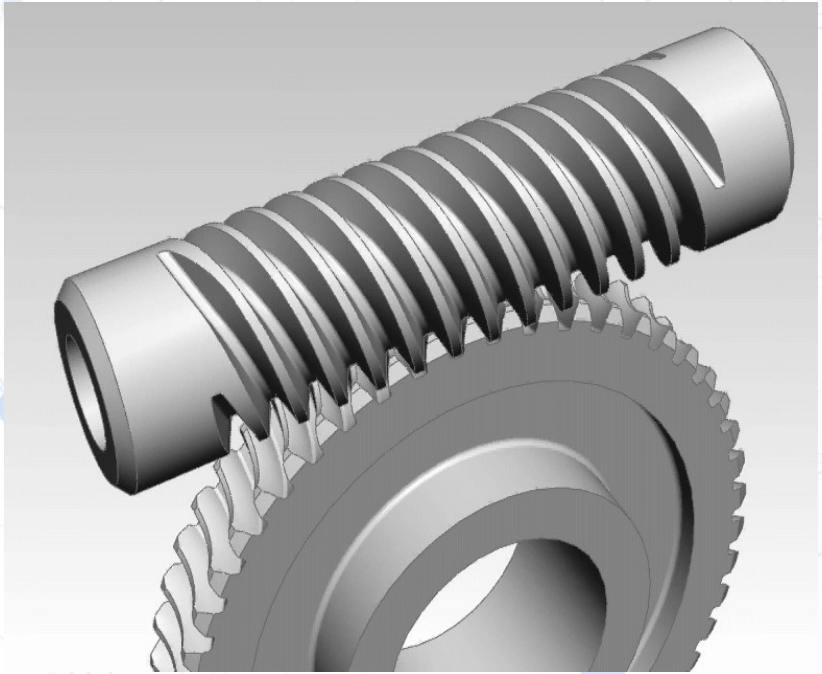
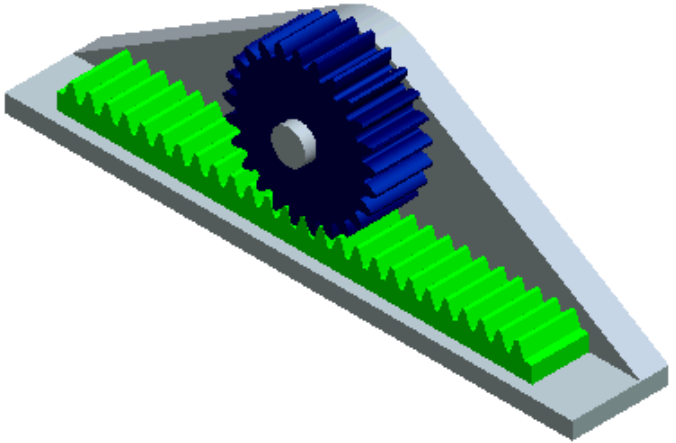
Worm Wheel



Rack and Pinion



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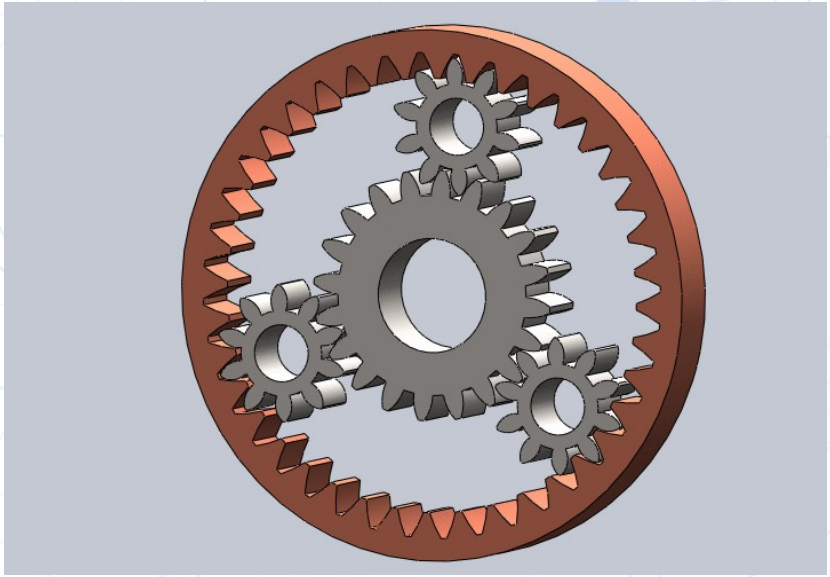
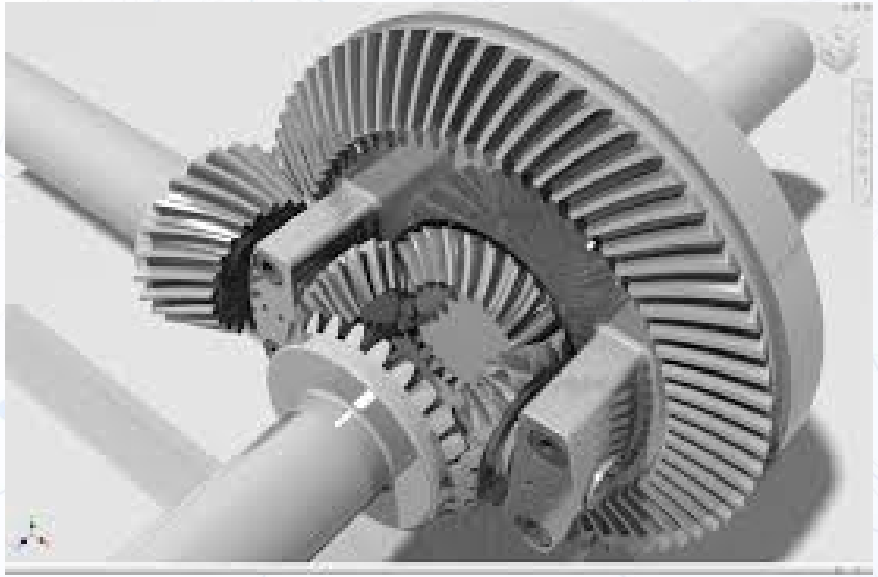
Planetary Gear



Differential Gear



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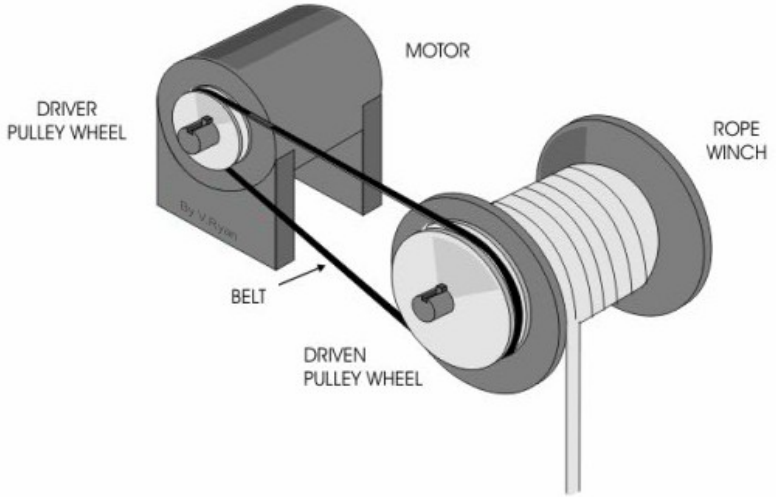
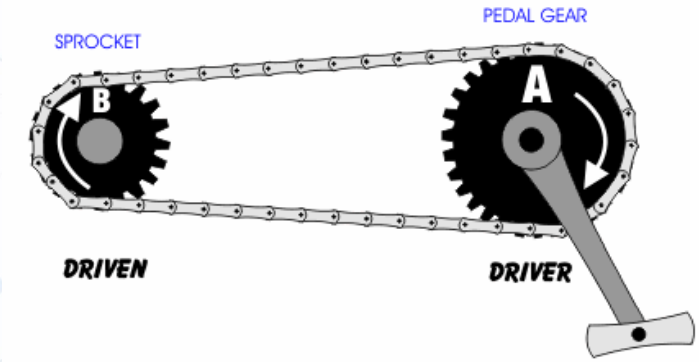
Belt-Pulley



Chain-Sprocket



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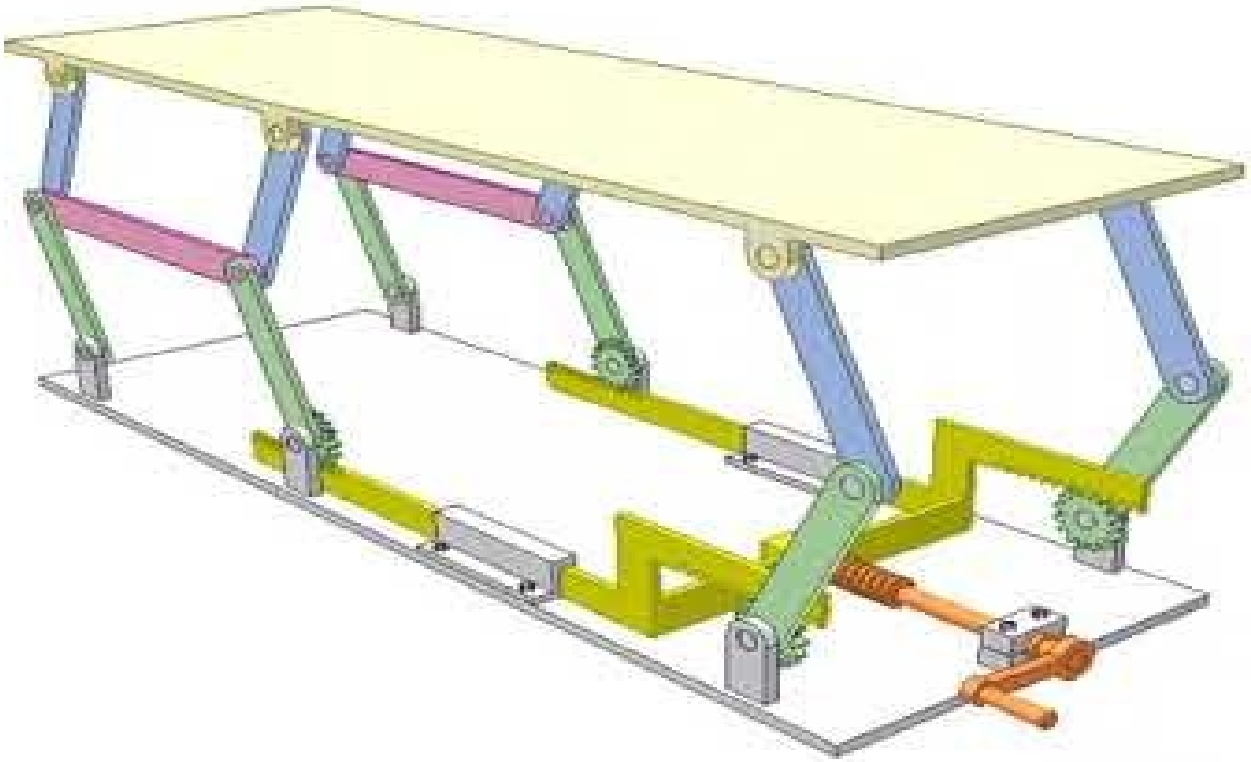

Actuators

An **actuator** is a component of a machine that is responsible for moving and controlling a mechanism or system, or in simple terms a mover.

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Types of Actuators

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Electric Actuators

- DC Motor
- Servo (Motor + Gear set + Control ckt + Position sensor)
- Stepper Motor
- Linear Actuator

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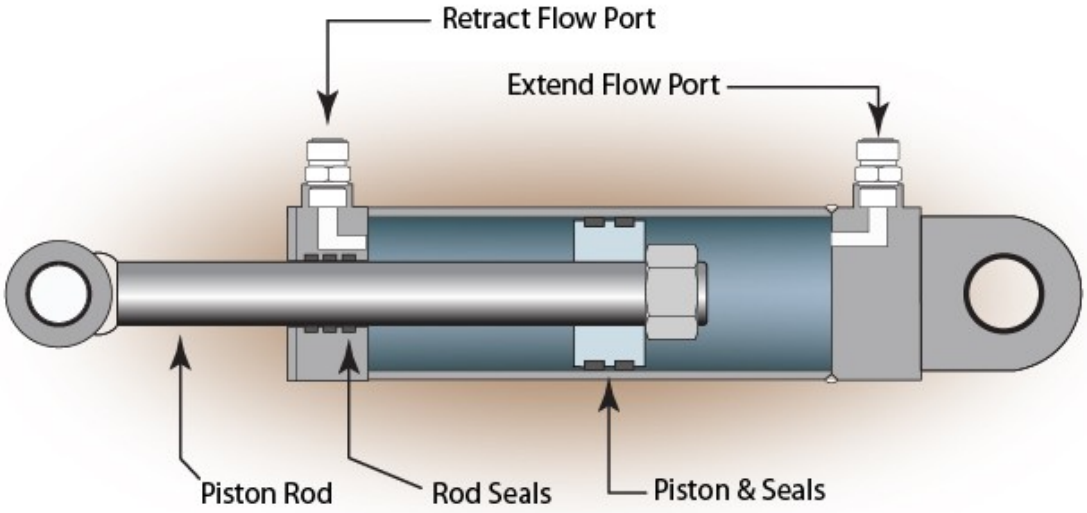
Hydraulics and Pneumatics



Hydraulics:
compressed fluid

Pneumatics:
Compressed air

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Contact us if you have any problem/ suggestion:

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