ARTBOTICS

Exploring Mechanisms

Cranks, Gears, and Cams
Mechanisms

- Convert rotary movement from a single motor into:
  - Smooth waving motions – **Crank**
  - Multiple rotary movements at different speeds – **Gears**
  - Linear motion – **Cams**
Crank

- Rotary movement to smooth waving motions

http://www.youtube.com/watch?v=hkb8JgMgVKc
Crank

- Rotary movement to smooth waving motions
Crank

* Connector and end bar can vary in size
* Connector to end bar joint placement can vary
* End bar to ground bar joint placement can vary
Crank

- *Connector* to *end bar* *joint* placement can vary

- Joint is 8 pegs from the bottom

http://www.youtube.com/watch?v=hkb8JgMgVKc
Crank

- Connector to end bar joint placement can vary

- Joint is 5 pegs from the bottom

http://www.youtube.com/watch?v=LOLtf_jcdFI
Crank

- End bar to ground bar joint placement can vary

- Joint is 5 pegs from the left

http://www.youtube.com/watch?v=ob2qLidY1hQ
Gears

- Multiple rotary movements with different speeds (gears)
Gear Sizes

Large
40 teeth

Medium
24 teeth

Small
8 teeth
Gear Ratios

- The speed changes because of the number of teeth on a set of interacting gears, known as the gear ratio.
- A gear with more teeth will move slower than a gear with less teeth.
- A gear with less teeth will move faster than a gear with more teeth.
- The number of teeth and size of the gear change how long it takes to complete one full revolution.
Gear Ratios

- A large gear against a medium gear
  40:24, or reduced to 5:3

- A medium gear against a small gear
  24:8, or reduced to 3:1

- A large gear against a small gear
  40:8, or reduced to 5:1
Gears

The orange star is spinning 5 times faster than the yellow star (motor power is set to 35)

http://www.youtube.com/watch?v=eUmTzvhMYic
The orange star is spinning 5 times slower than the yellow star (motor power is set to 35)

http://www.youtube.com/watch?v=2uYdqjY7-CI
Cams

- Rotary movement to linear motion

http://www.youtube.com/watch?v=ew3um8M_Fhg
Cams

- Rotary movement to linear motion
A **cam** is a curved piece that rotates and moves its accompanying **follower**.
A cam is a curved piece that rotates and moves its accompanying follower.
Cams

- Multiple cams can be attached to a single bar out of the motor
Cams

- There are two types of Lego pieces that can be used to make cams, or you can make your own out of foamcore and electrical tape.
Cams

http://www.youtube.com/watch?v=-jZfFfGlQ90

Circular cam
Cams

http://www.youtube.com/watch?v=bH0mkK0xBzo

Snail cam