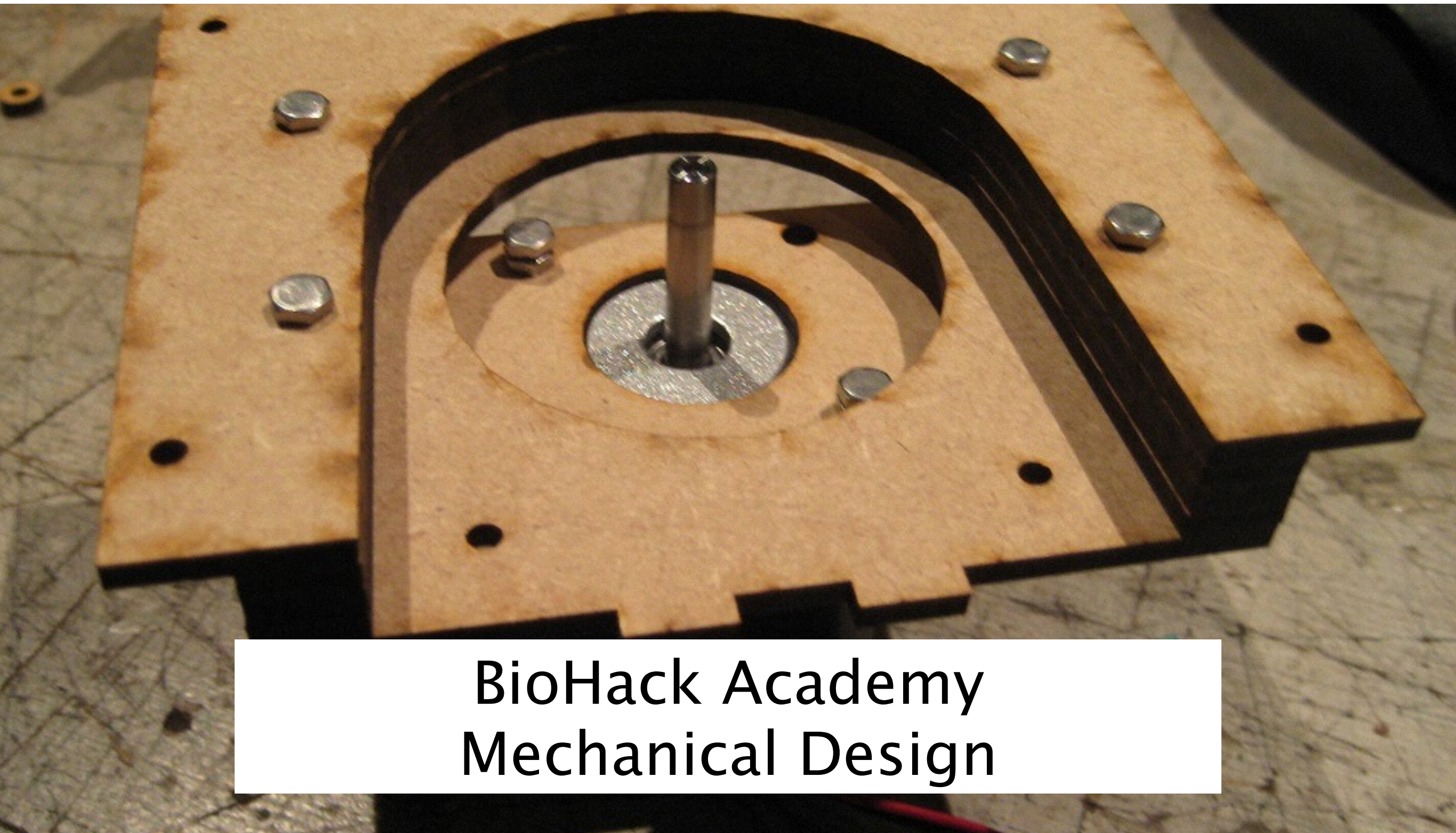




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**BioHack Academy  
Mechanical Design**





# Maker Movement

## THE MAKER MOVEMENT MANIFESTO

Smart Citizens

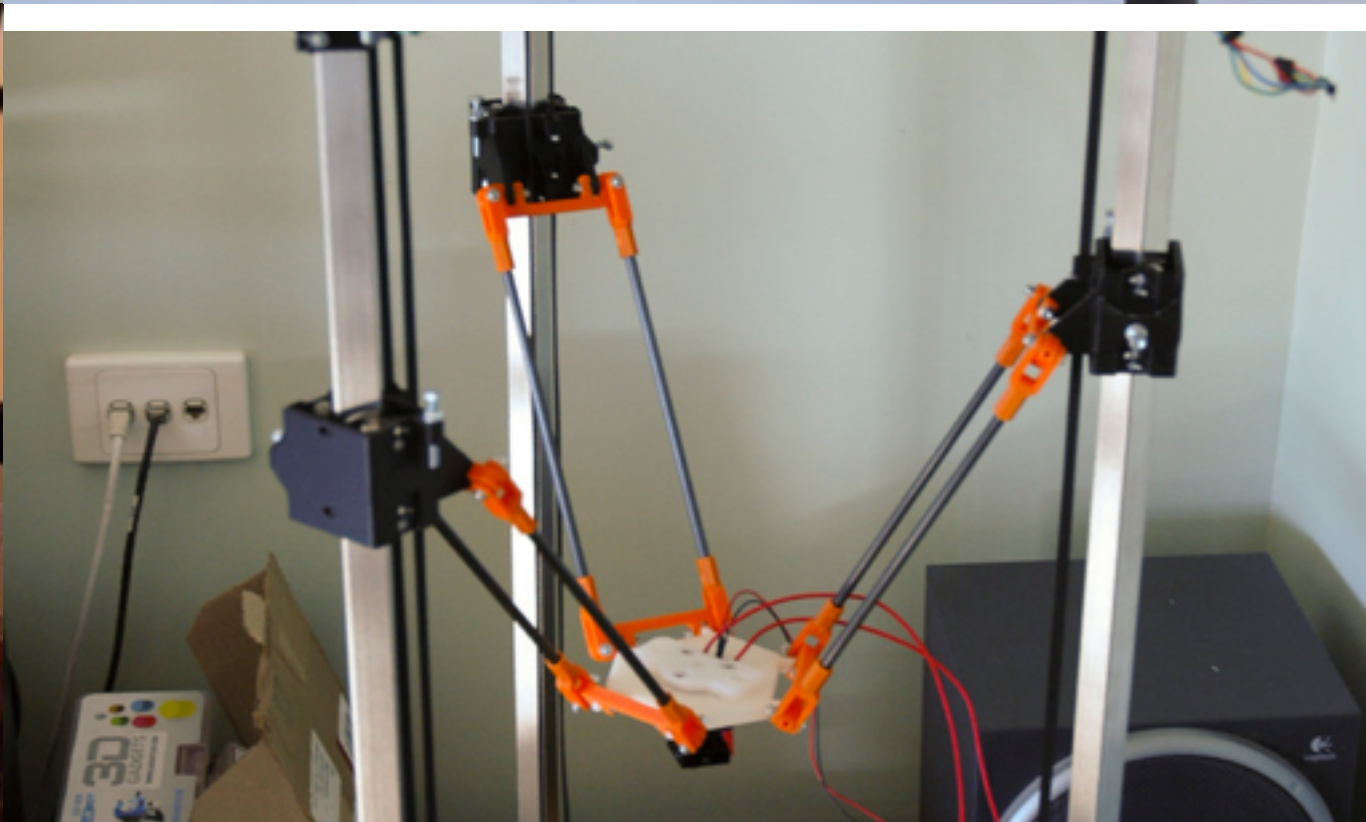
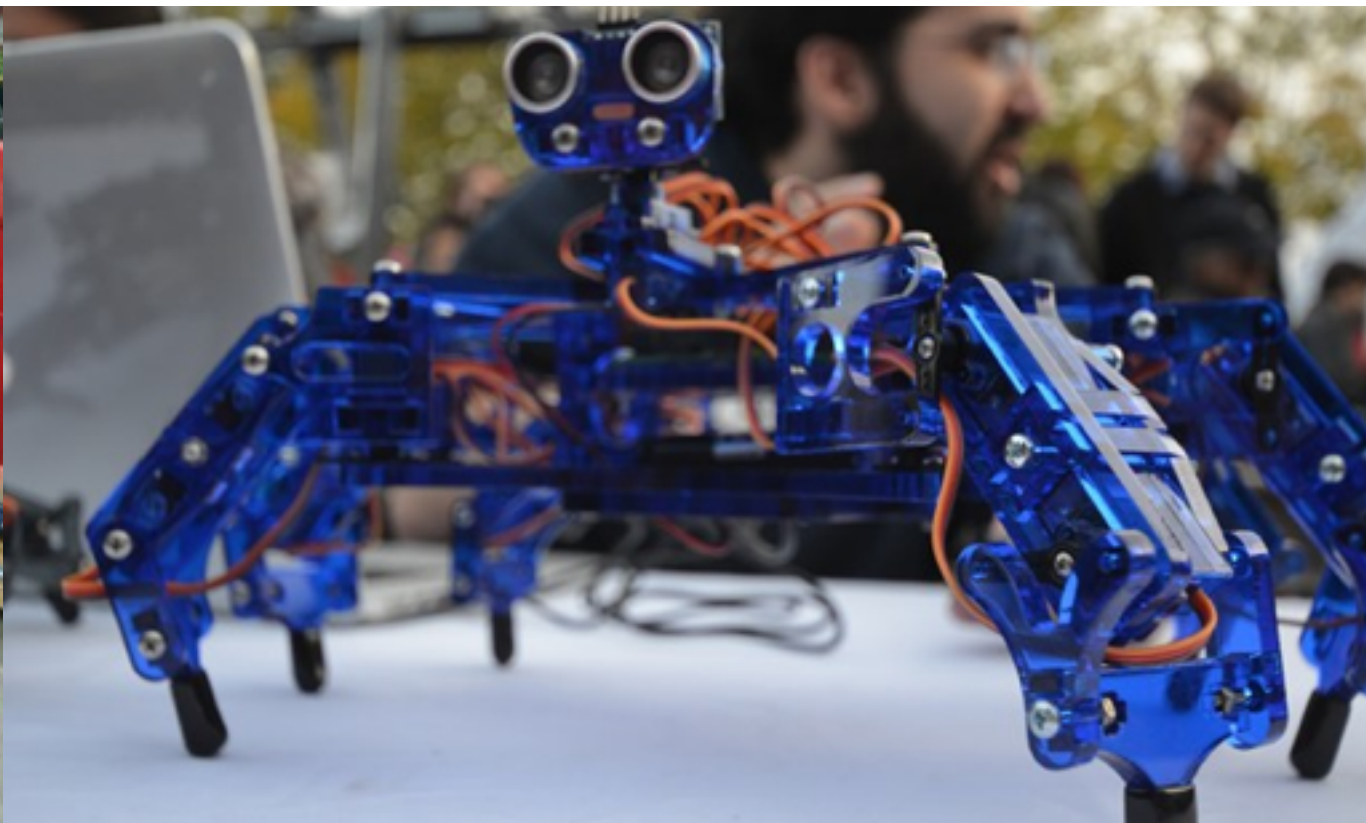
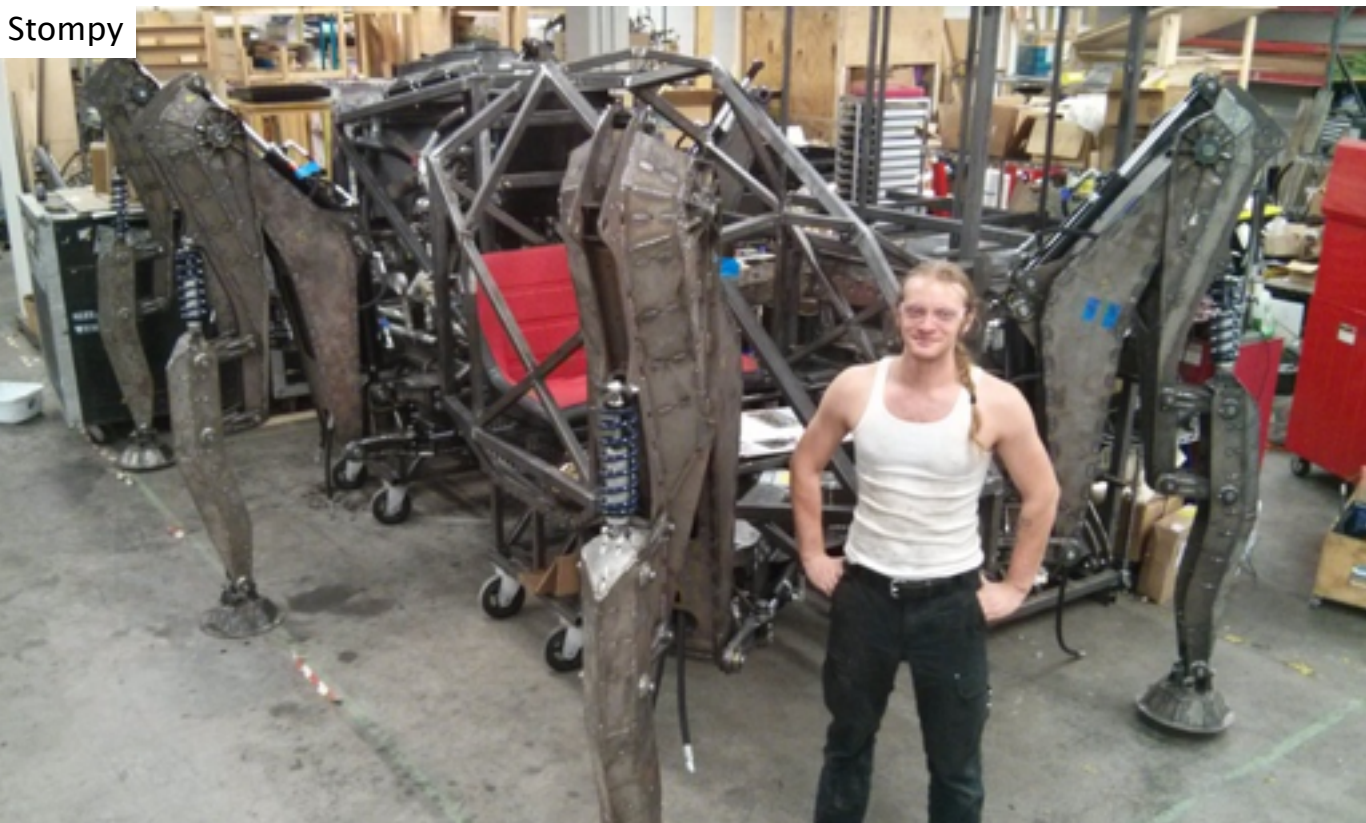






# Maker Movement

Stompy

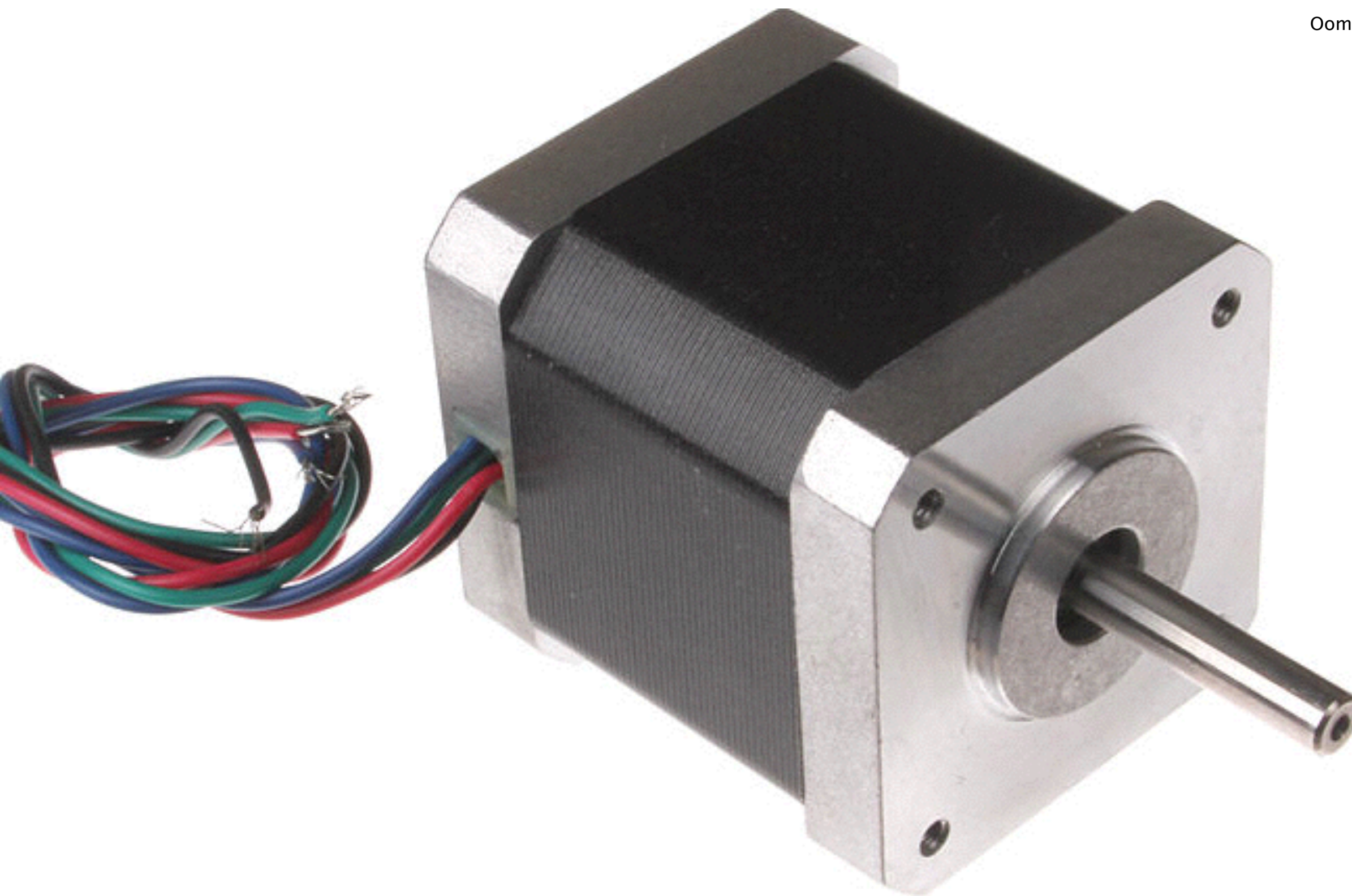






# NEMA17

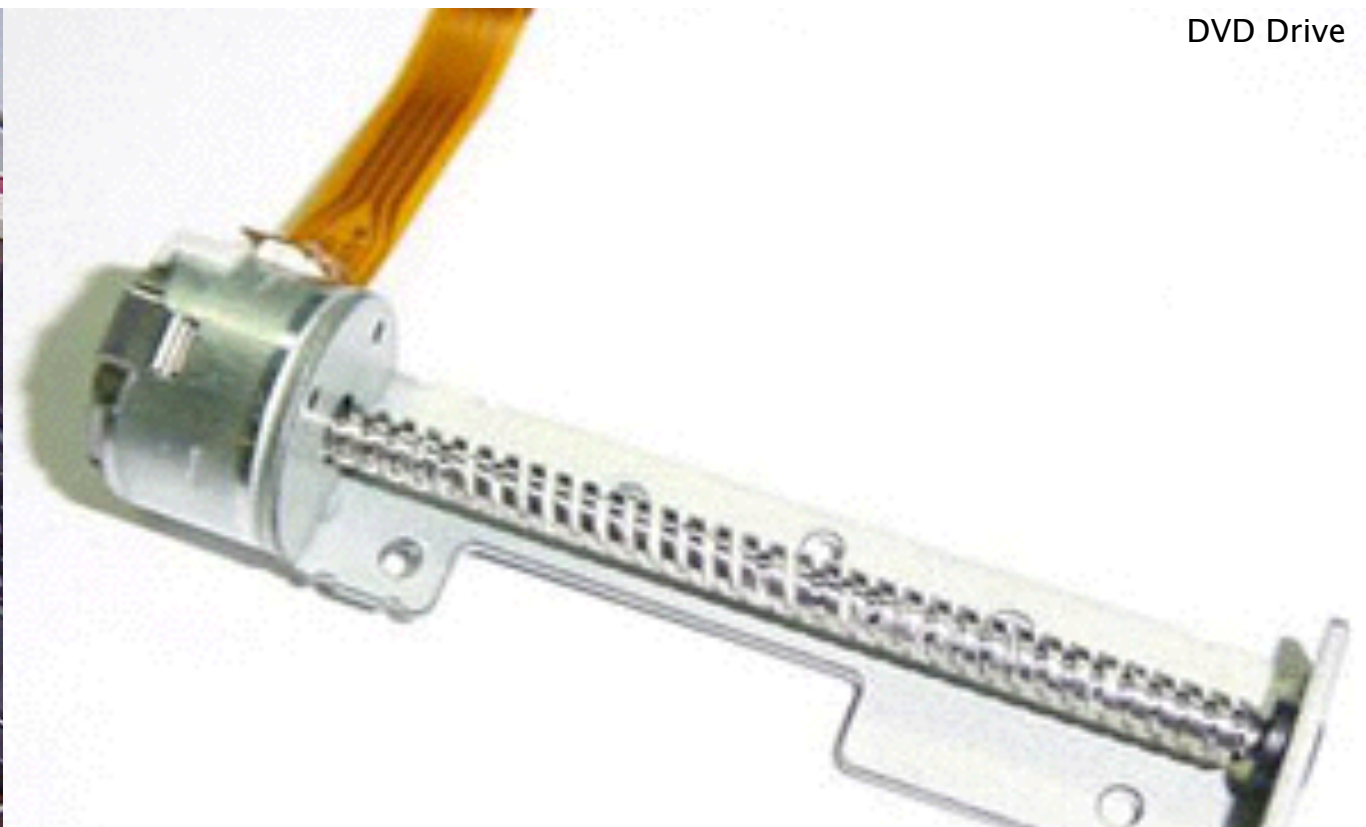
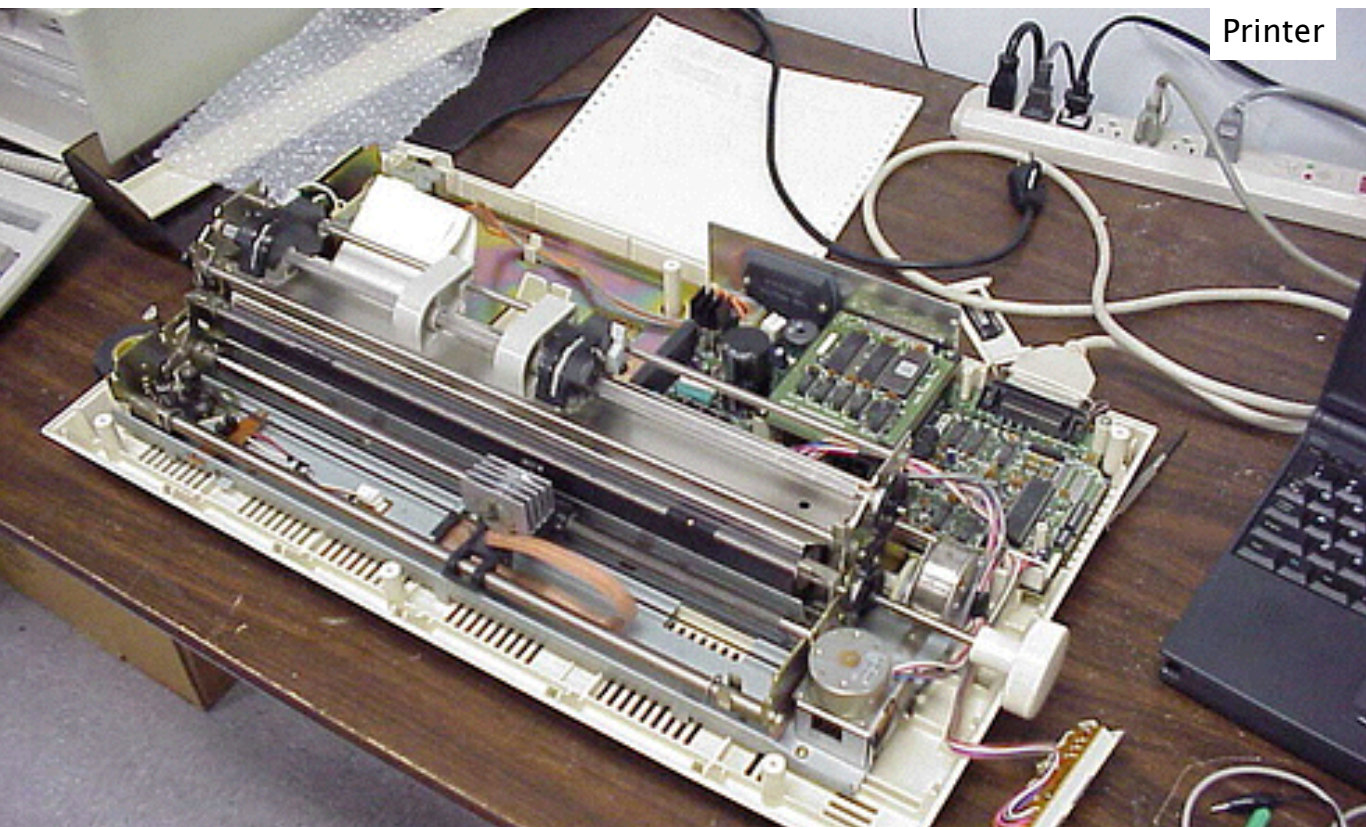
Oomlout - CC-BY-SA 2.0







# Where to find stepper motors







# DC Motor







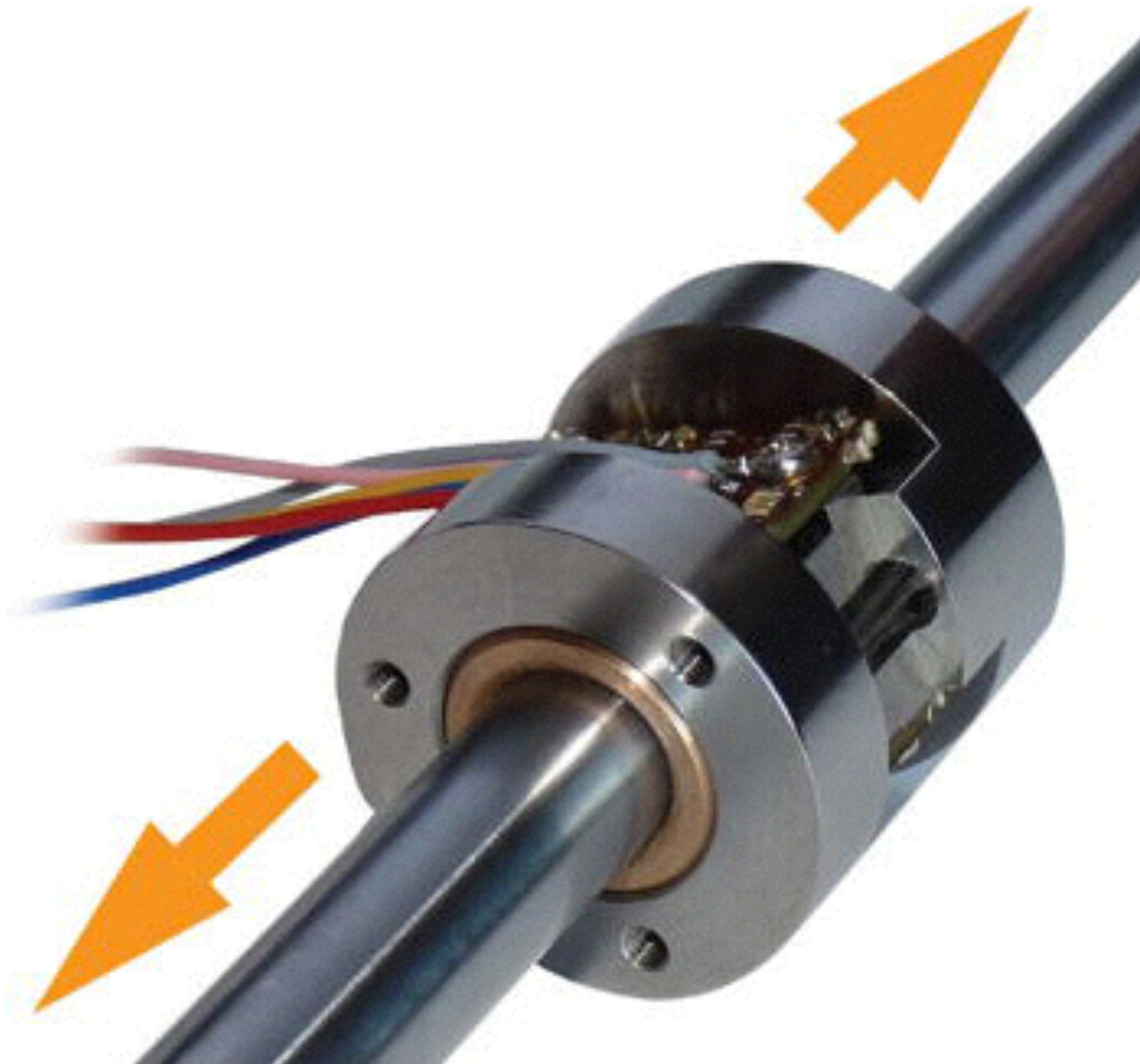
# Where to find DC motors







# Magnetic Actuator







# Ways to make things move

## Timing Belt



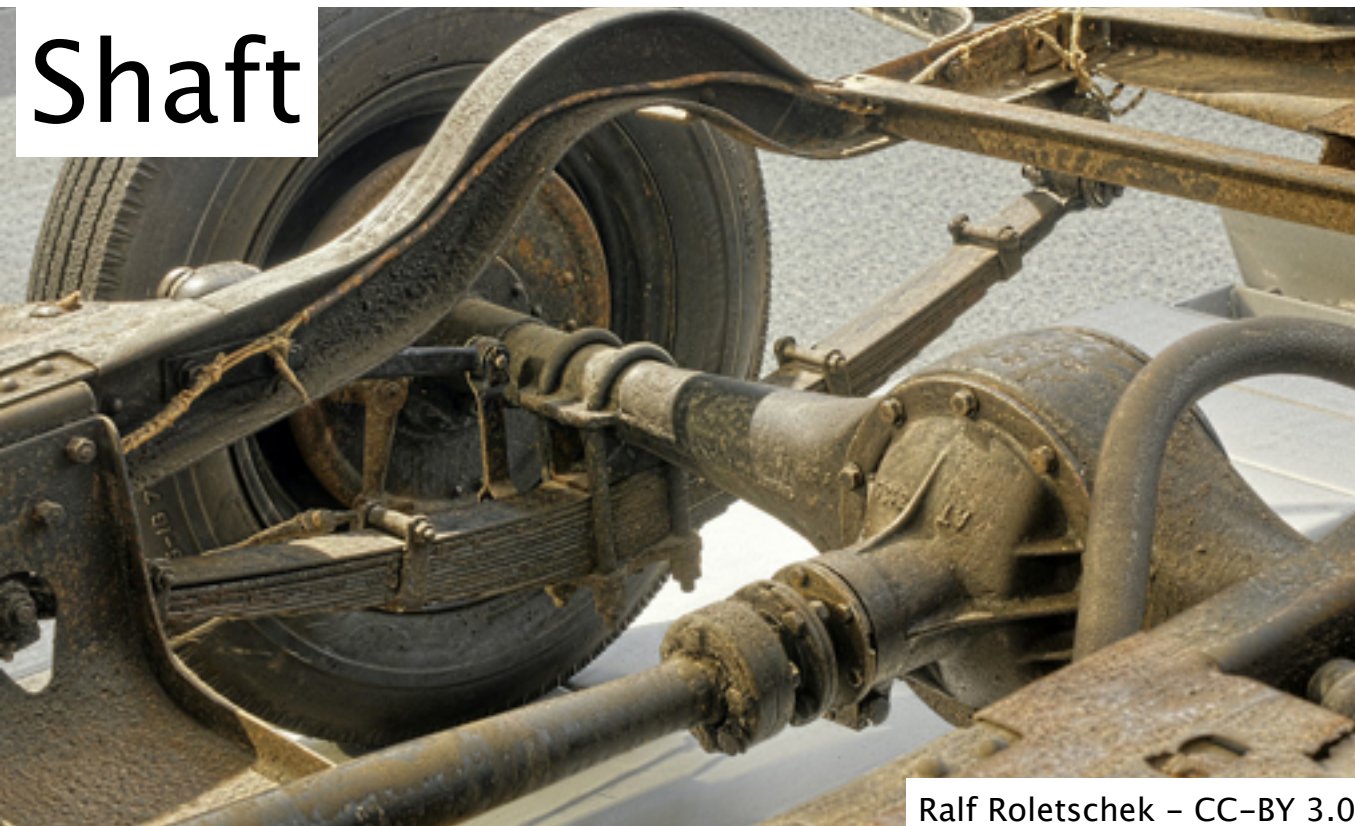
Terabase CC-BY-SA 3.0

## Chain



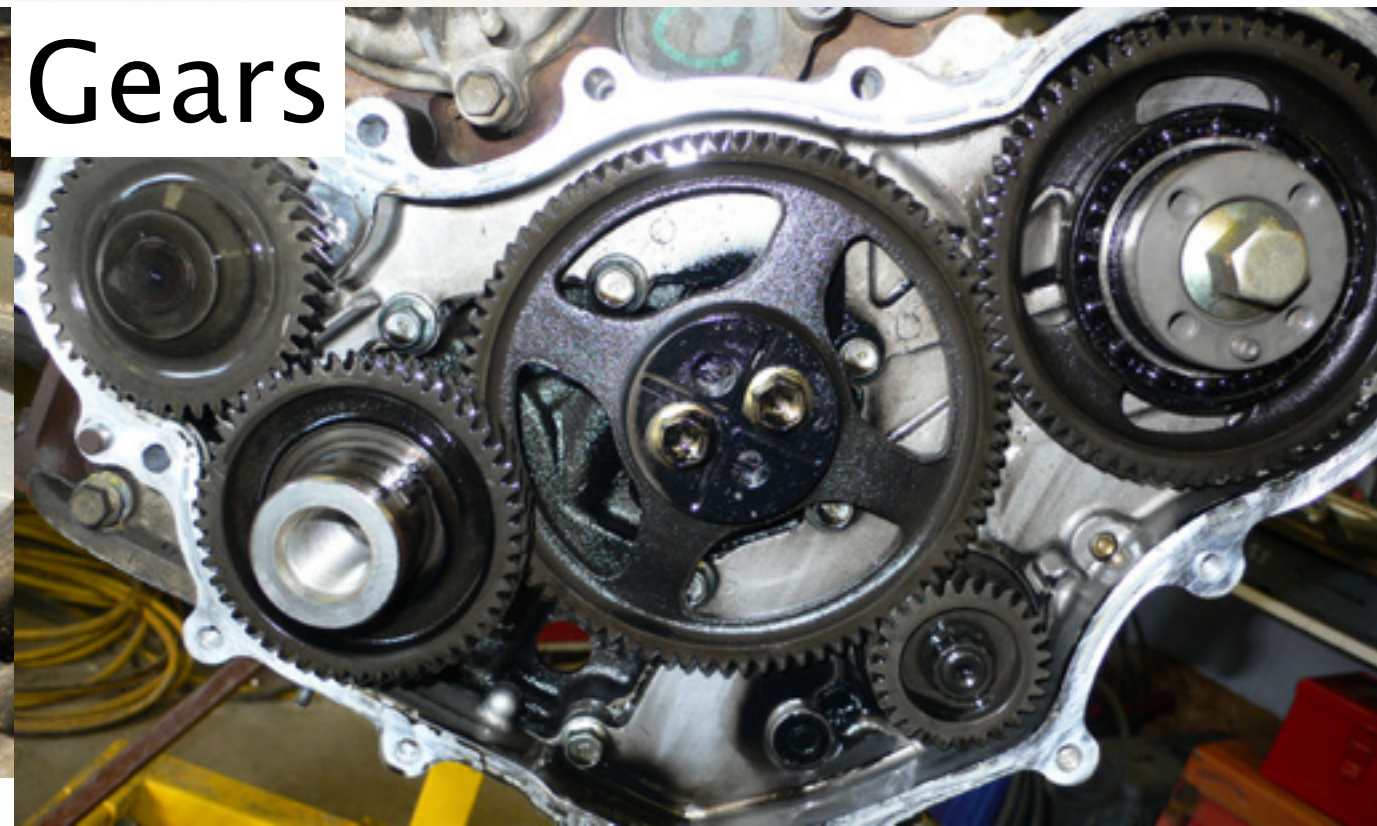
Andrew Dressel - CC-BY-SA 3.0

## Shaft

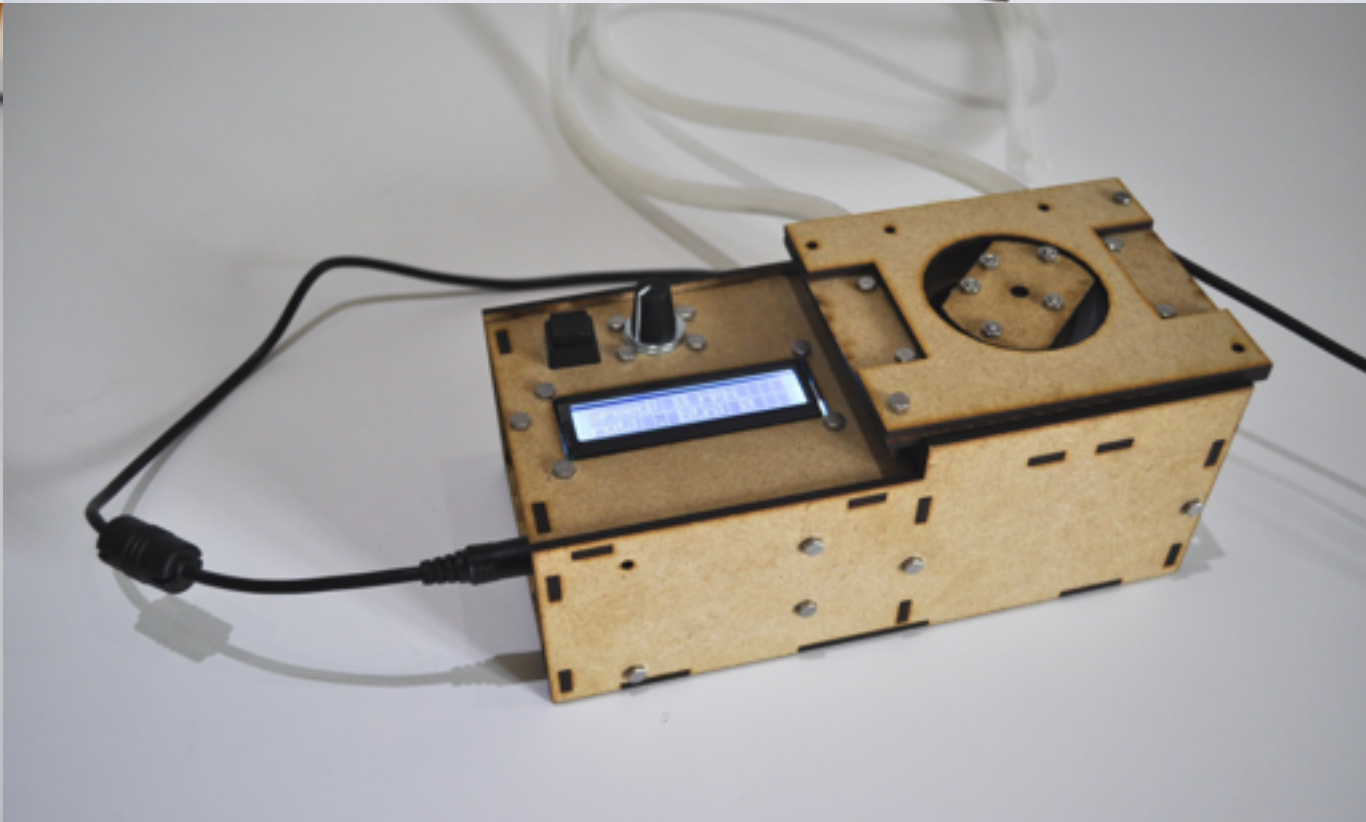
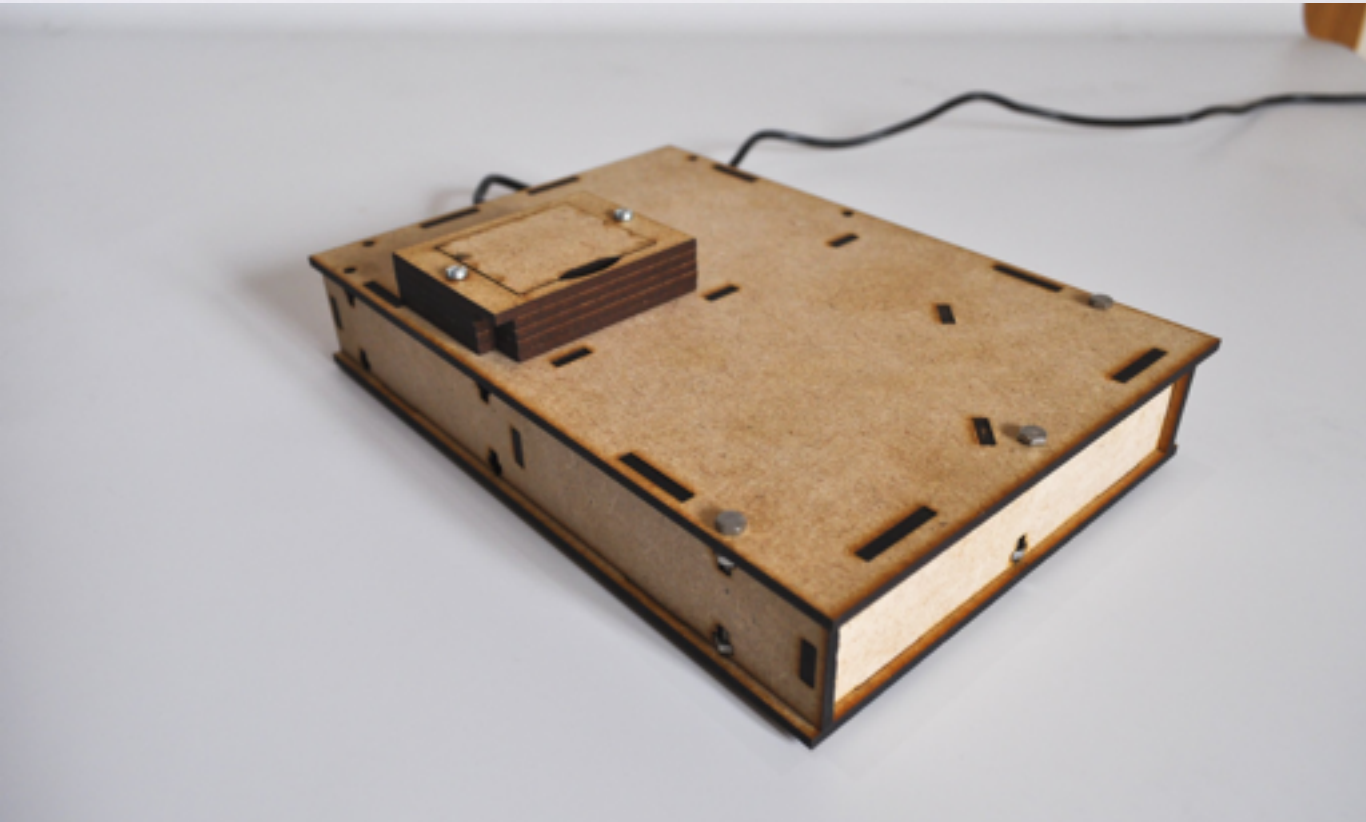
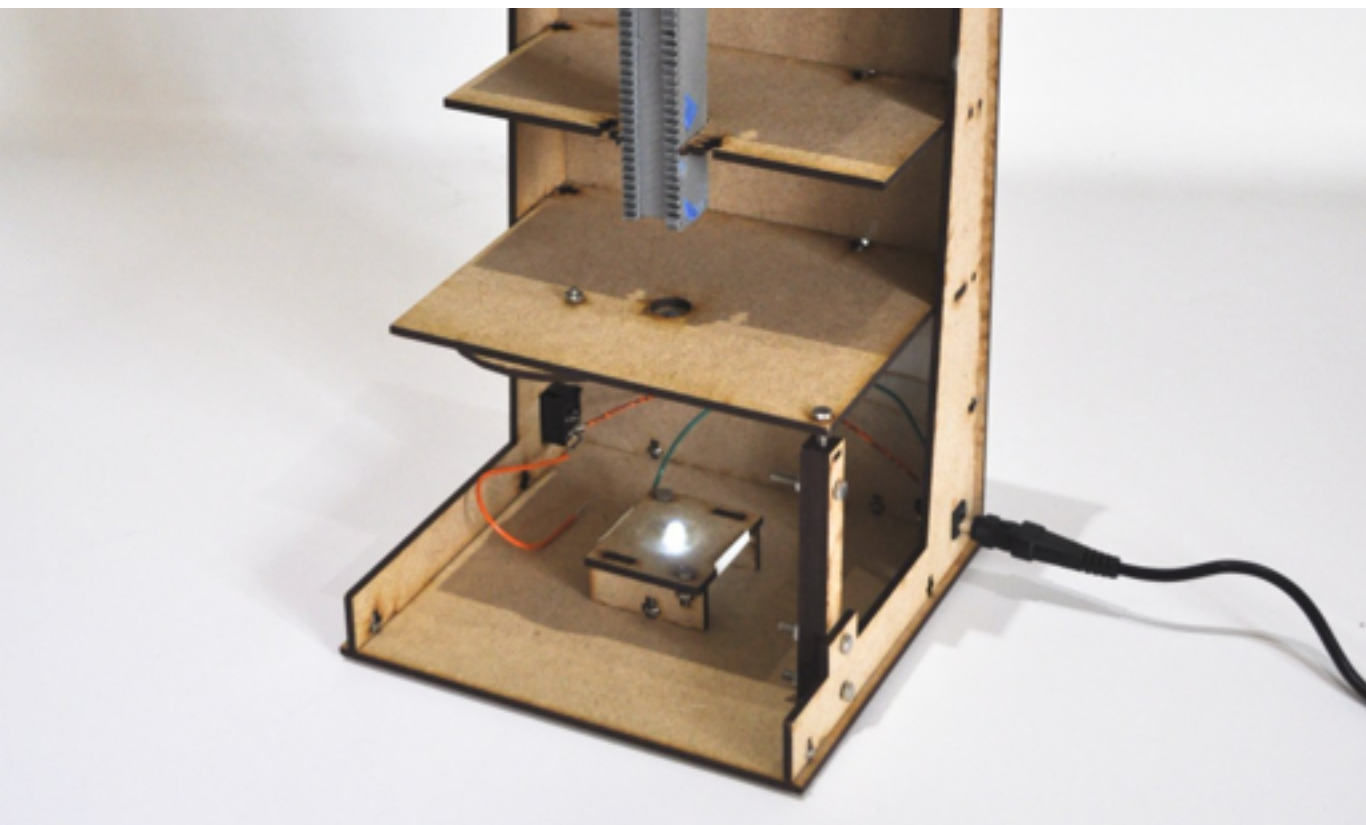


Ralf Roletschek - CC-BY 3.0

## Gears











# Hinging







# Folding







# Tension







# Sliding







Nesting







# Inflatables







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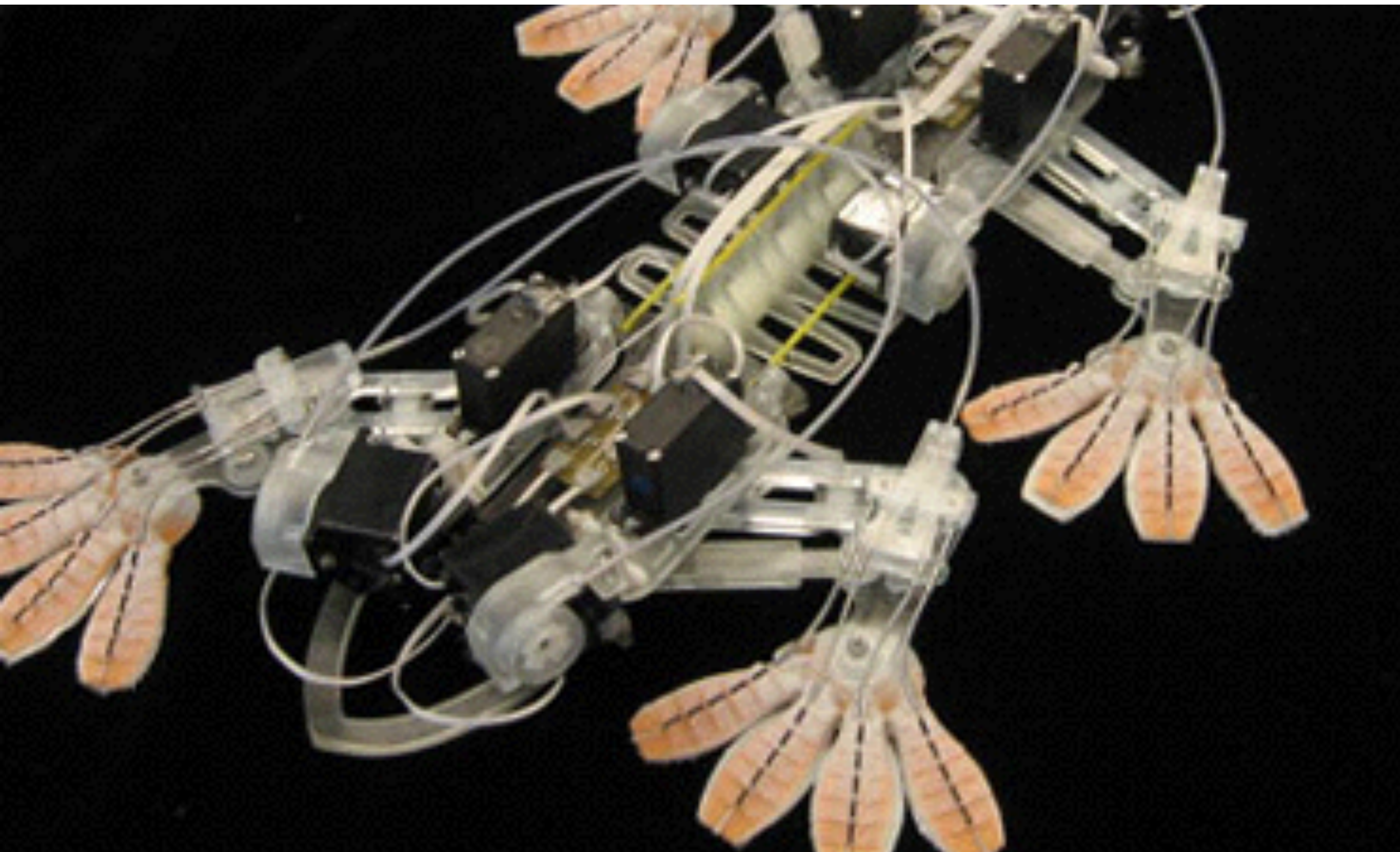
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# Movement in Biology





# Biomimetics







The best things in life are for free



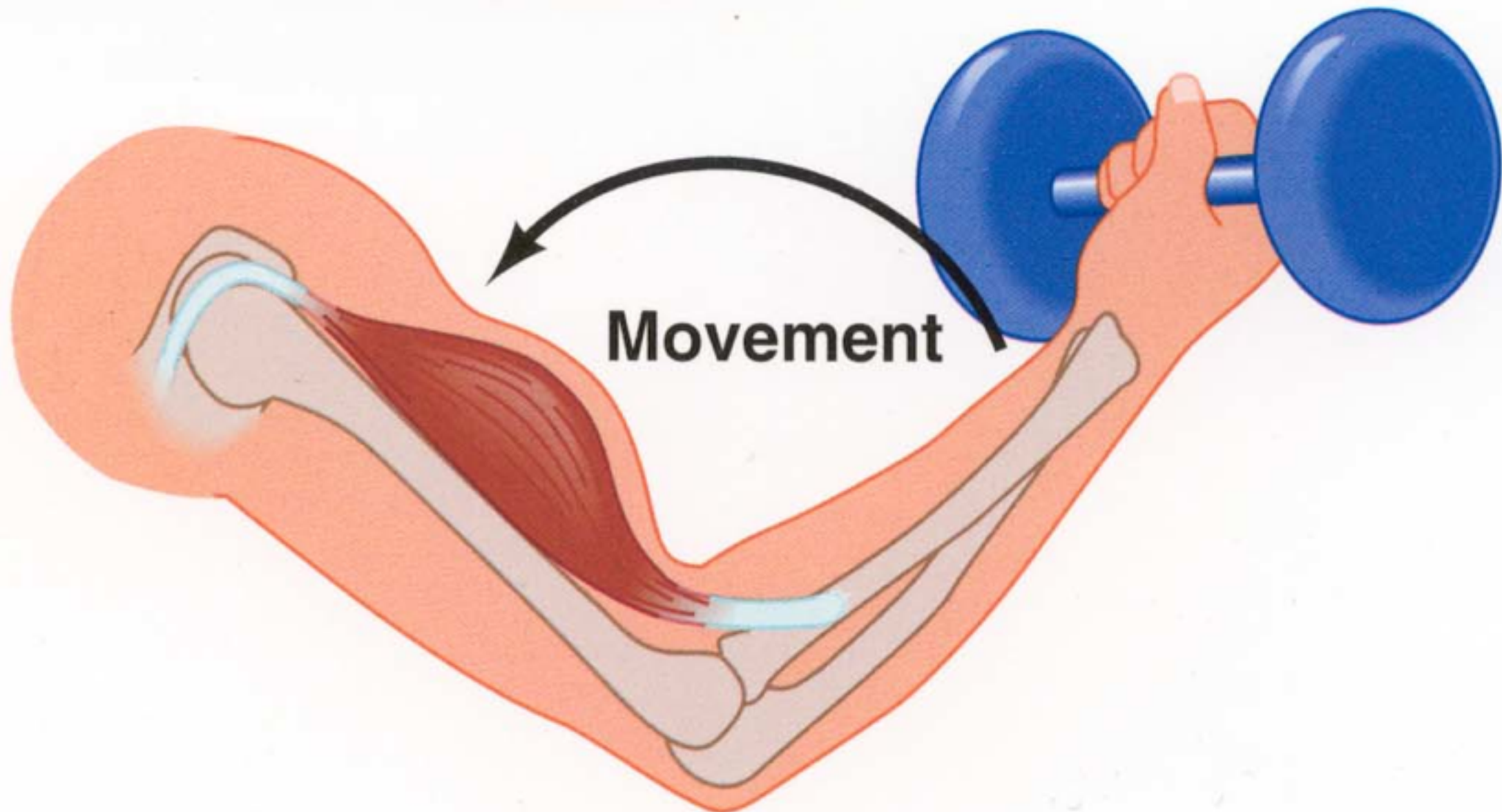




NO MOVEMENT

## Concentric contraction

(a)

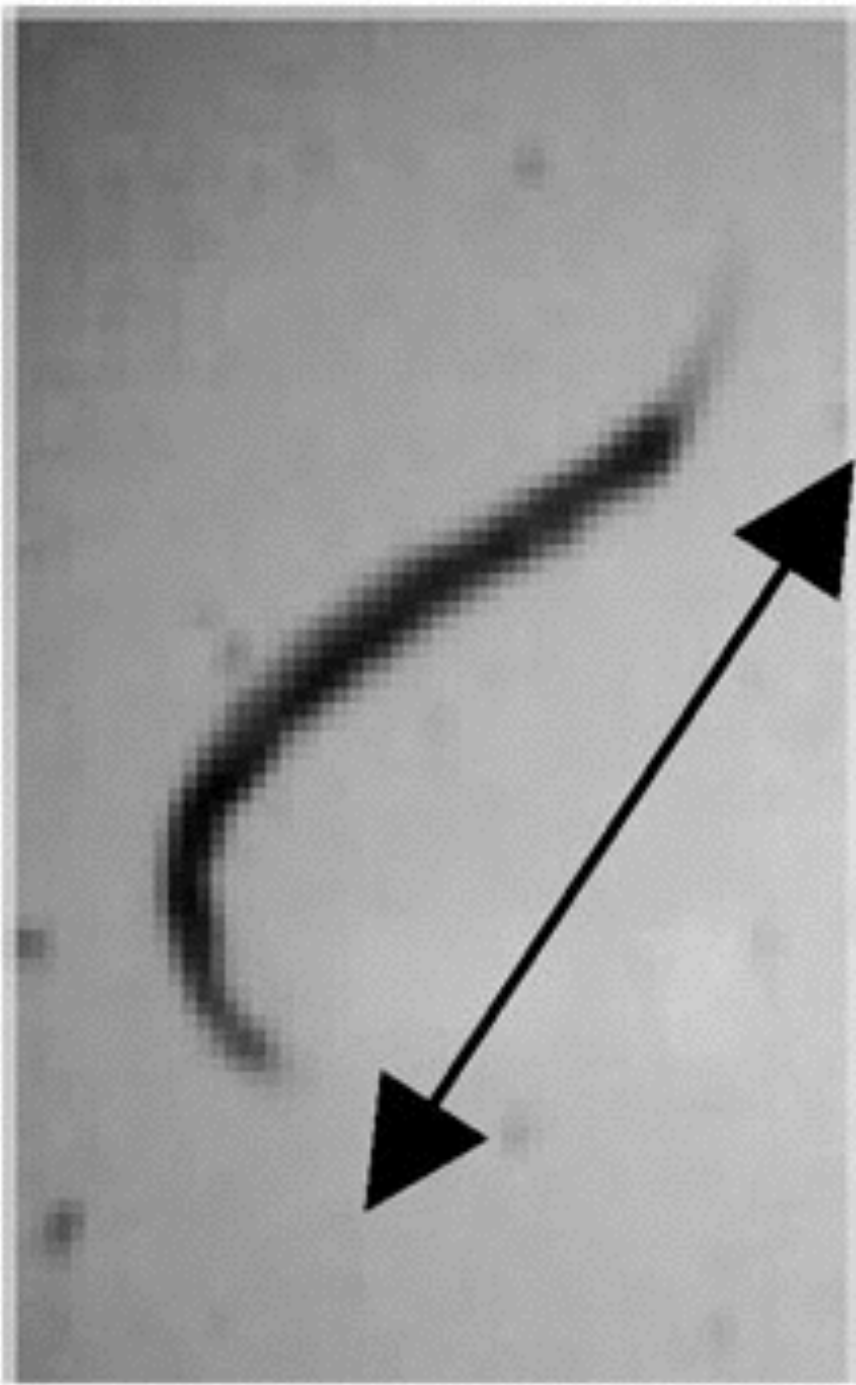
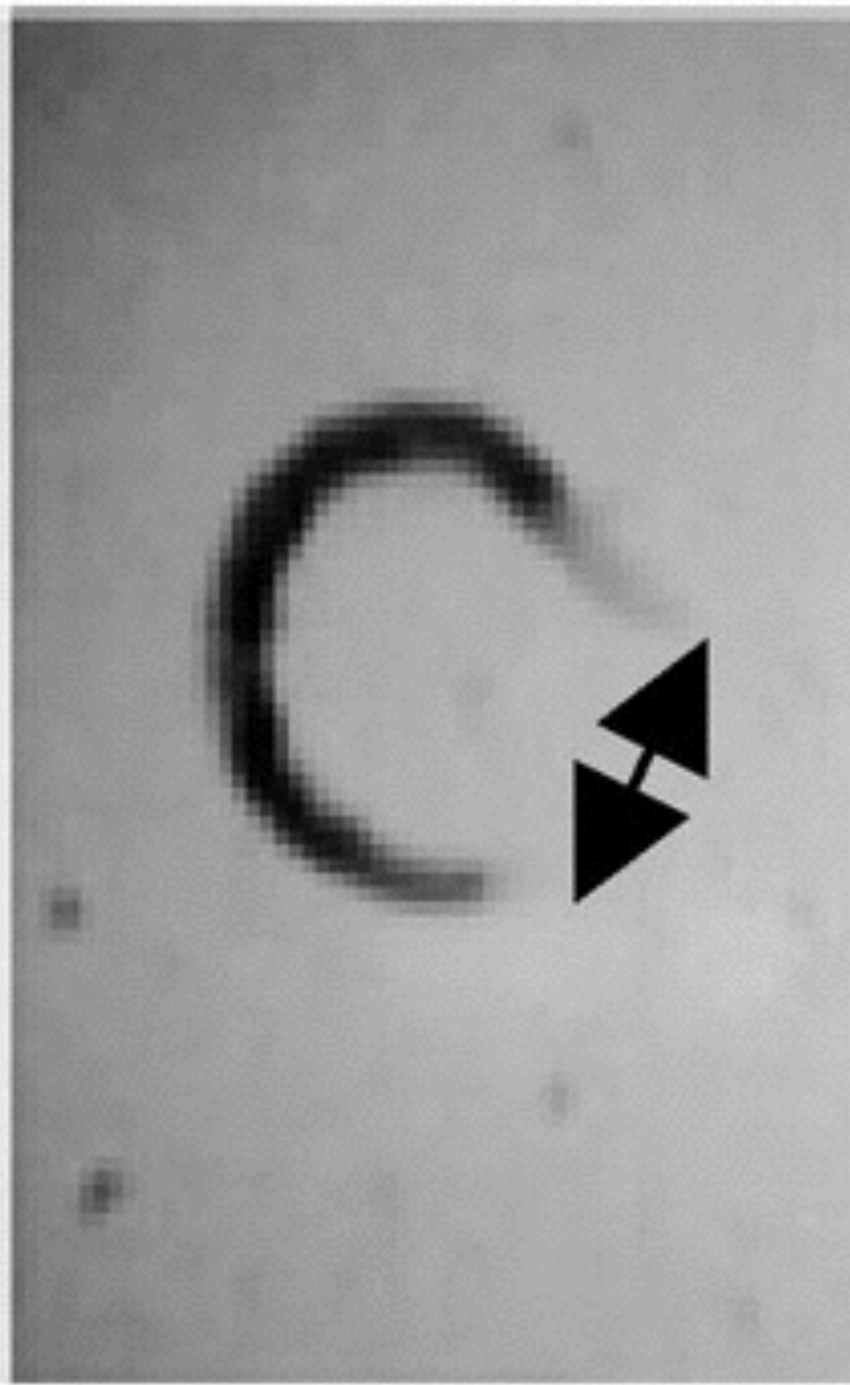
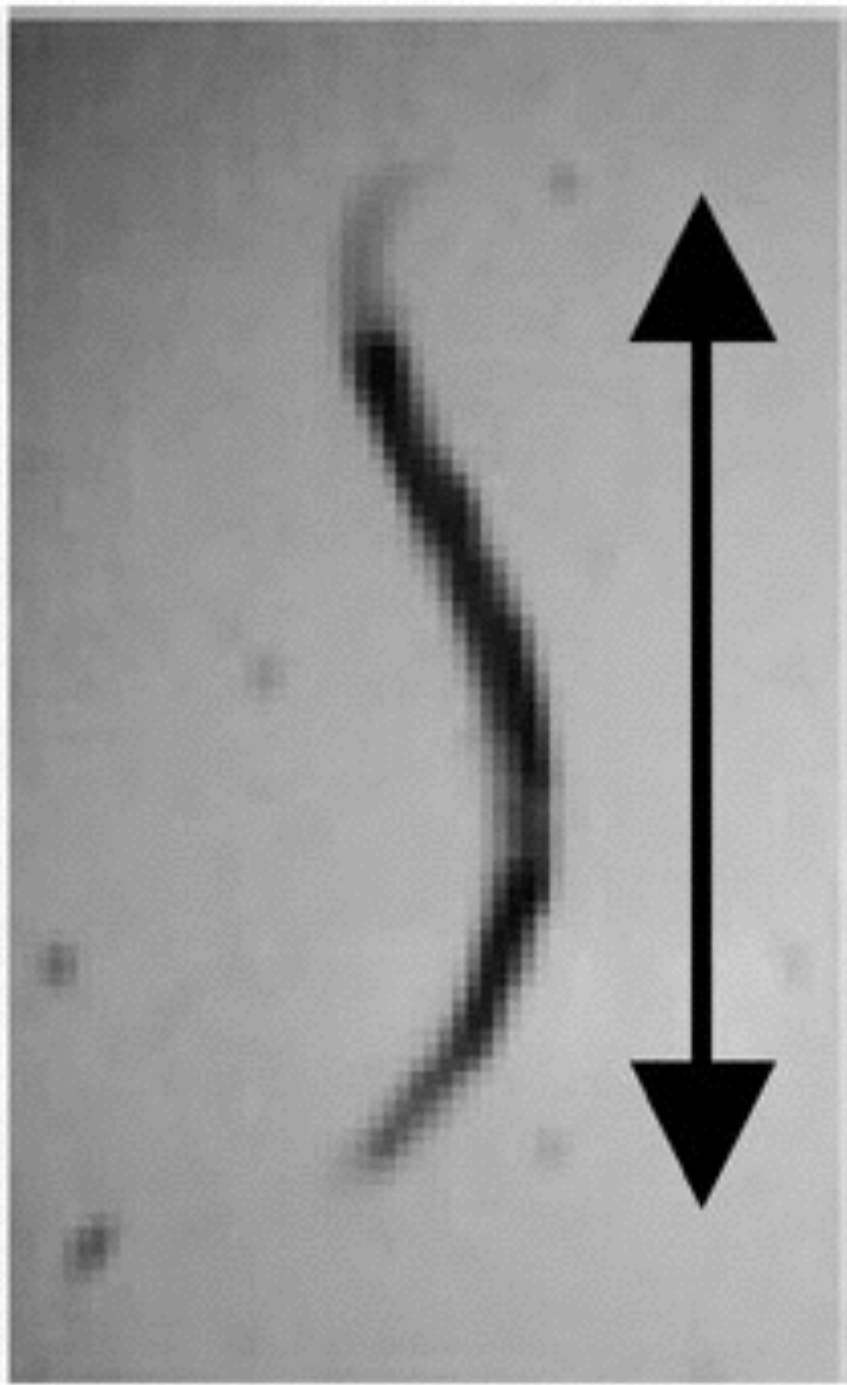


(b)





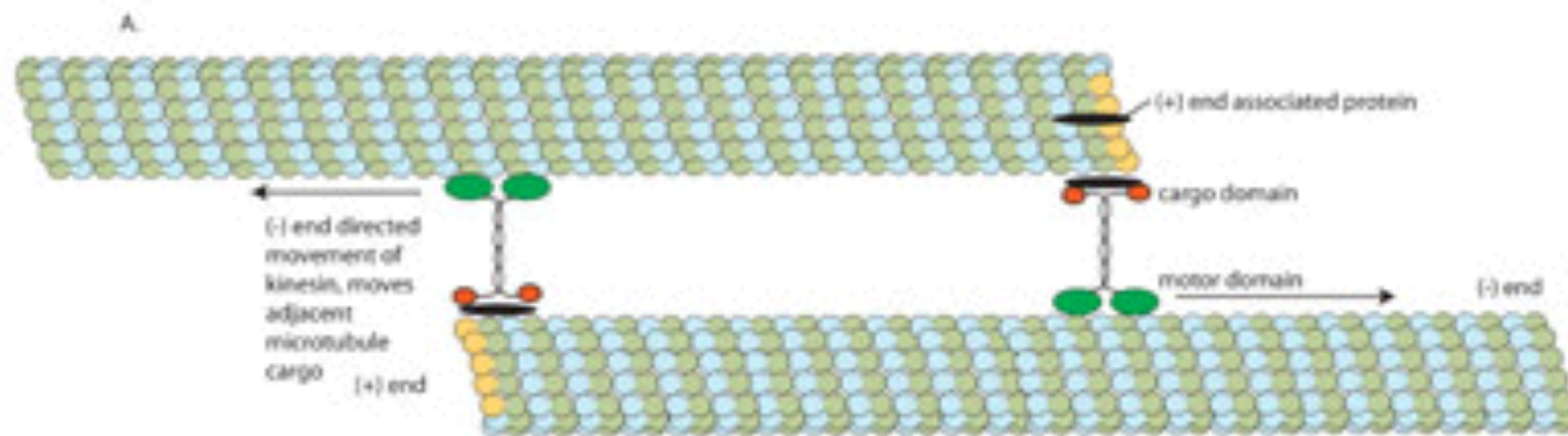
# C Elegans



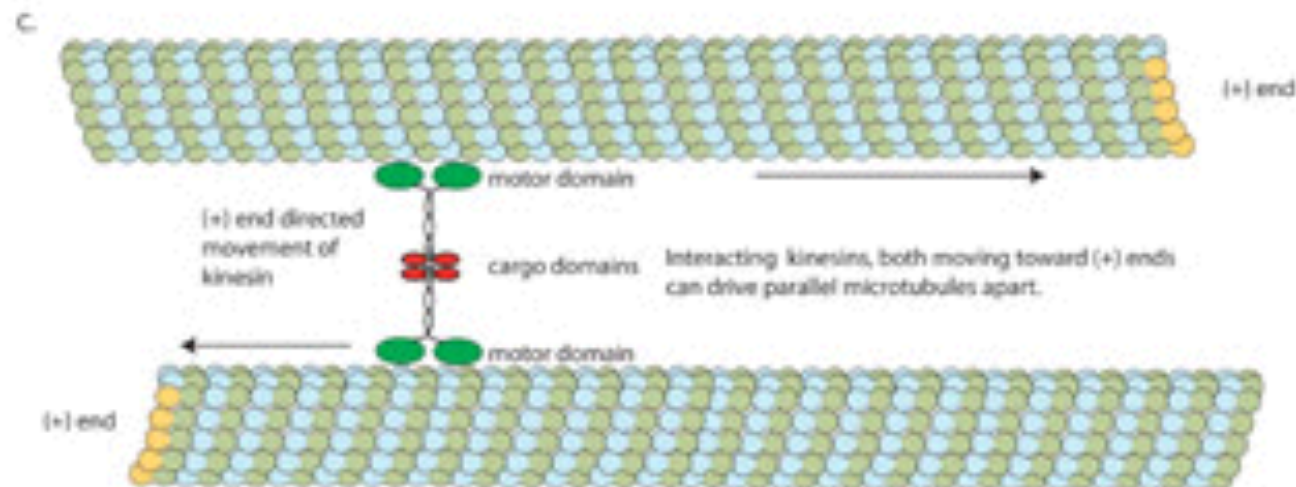
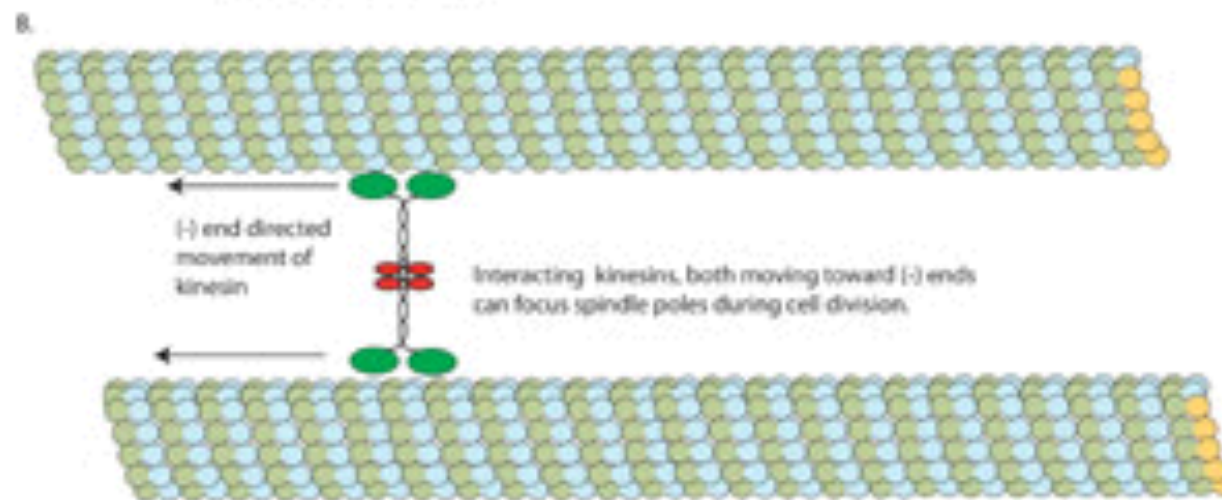




# Microtubul movement



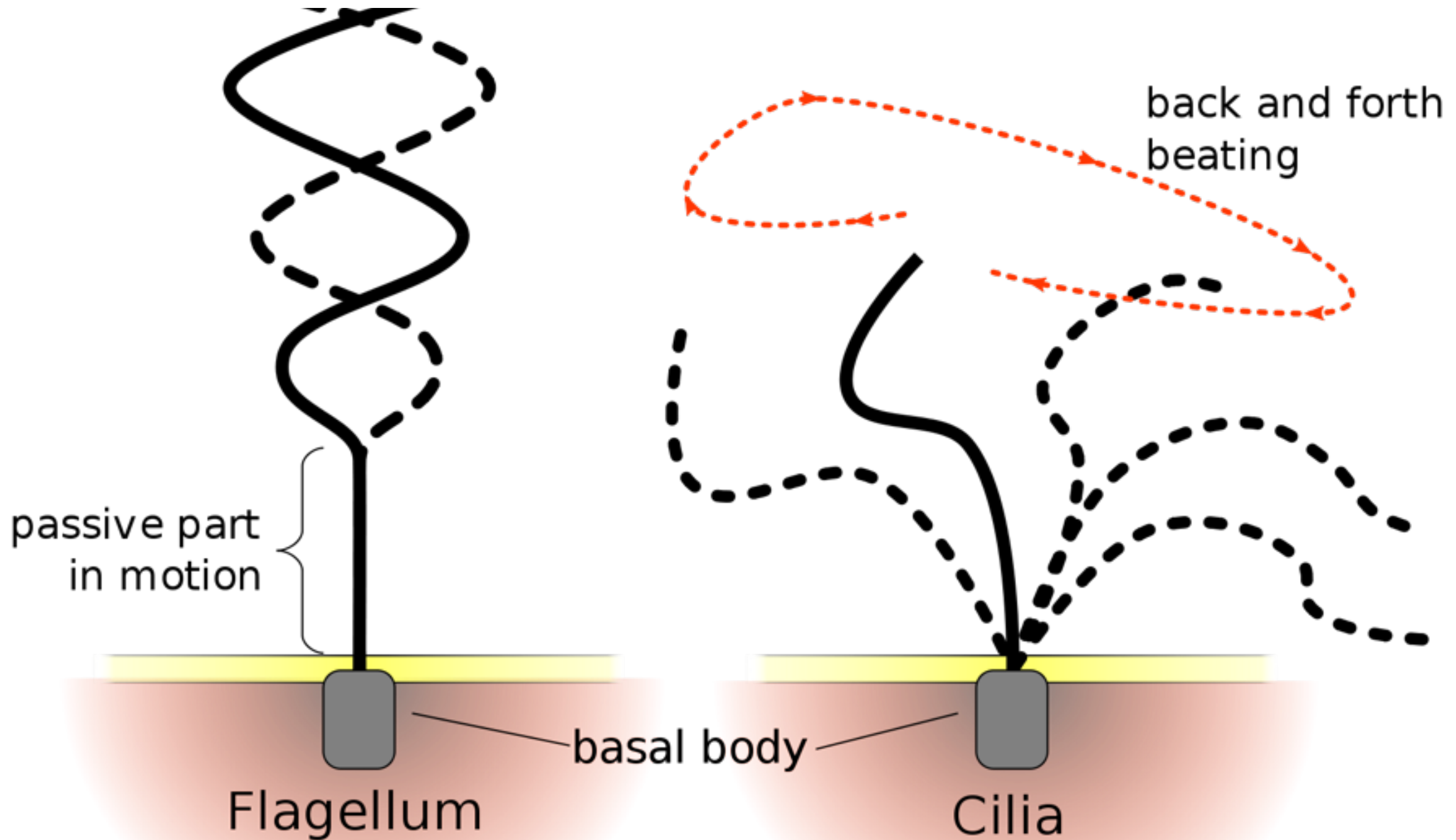
Mutual sliding of microtubules caused by (-) end - directed kinesins, increasing overlap between two parallel microtubules.







# Flagella







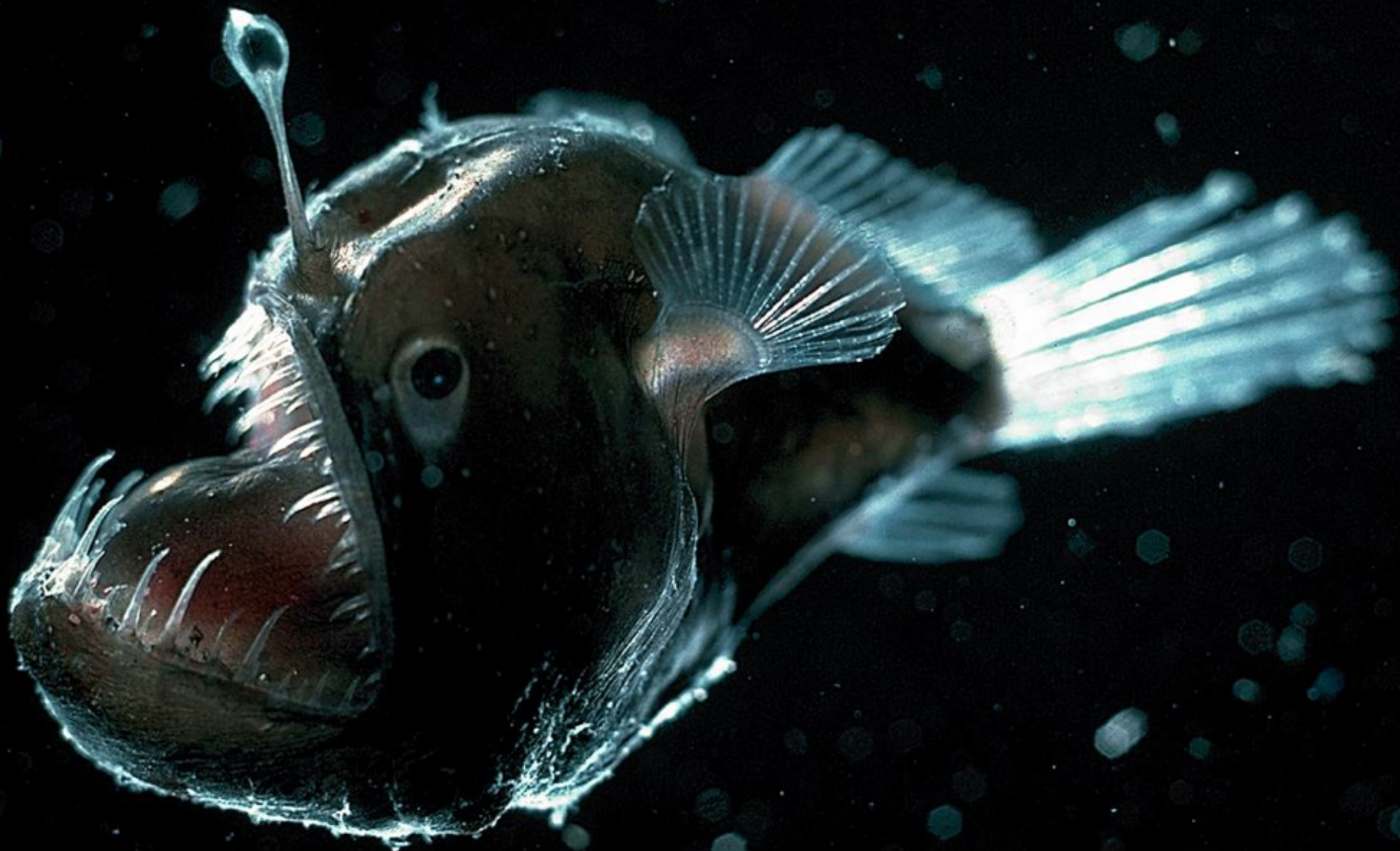
## 6: Salamander tongue







## 5: Angerfish suction







## 4: Mantis Shrimp shockwave







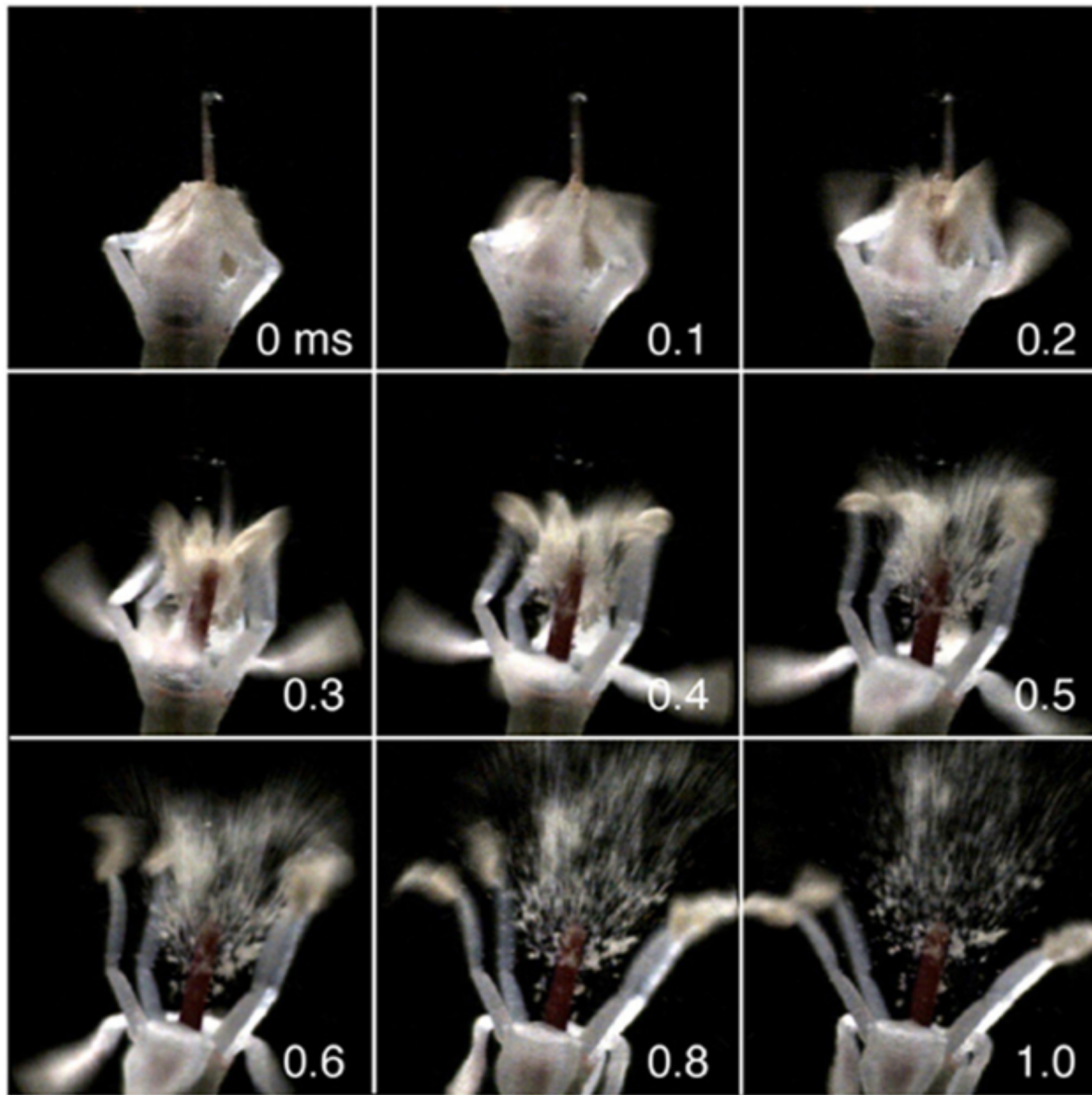
### 3: Trapdoor stomach Bladderwort







## 2: Pollen cannon







# 1: Jellyfish stingers







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# Documentation

## & Graduation



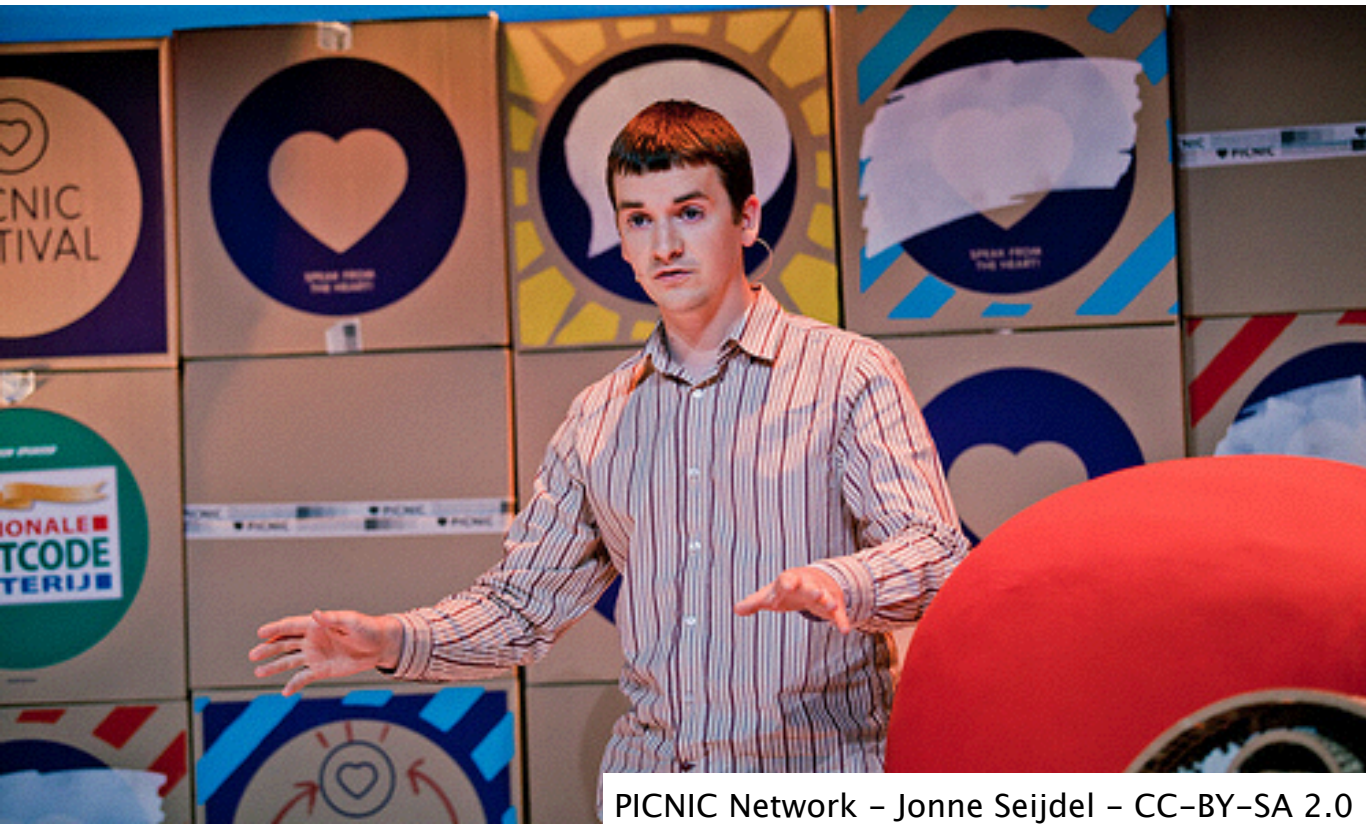


# Graduation Board

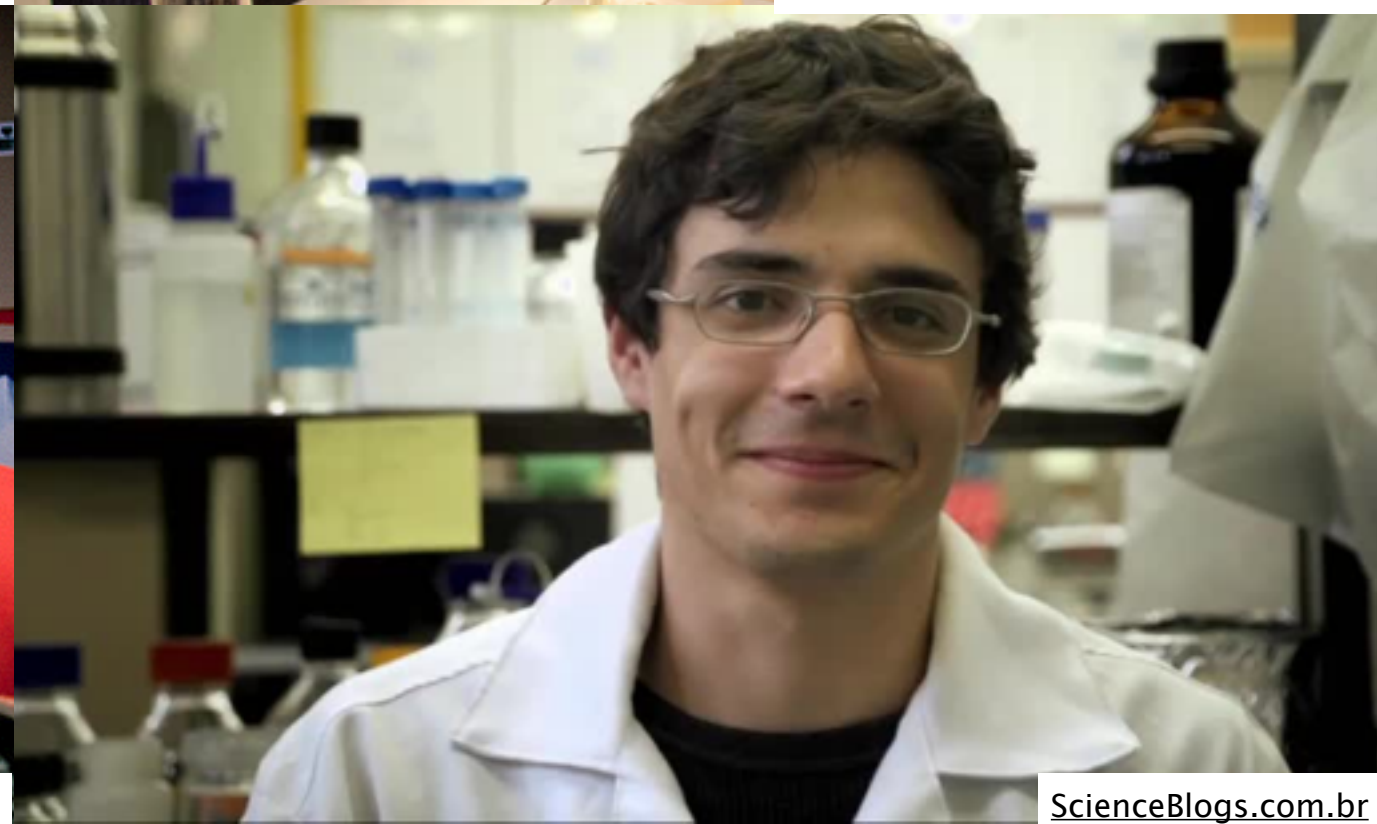
Rudiger Trojok  
Cathal Garvey  
Otto Heringer



Medical Museion – CC-BY-SA-NC 2.0



PICNIC Network – Jonne Seijdel – CC-BY-SA 2.0



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# Assignments

Weekly assignments to focus efforts:

1. Set up your own documentation site on Github;
2. Publish a microscopy video;
3. Design a personal laboratory tool;
4. Search for similar projects within the Biohack community;
5. Start sketching your bioreactor controller;
6. Design your bioreactor dimensions and fluxes;
7. Hack the spectrometer into a flow spectrometer;





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