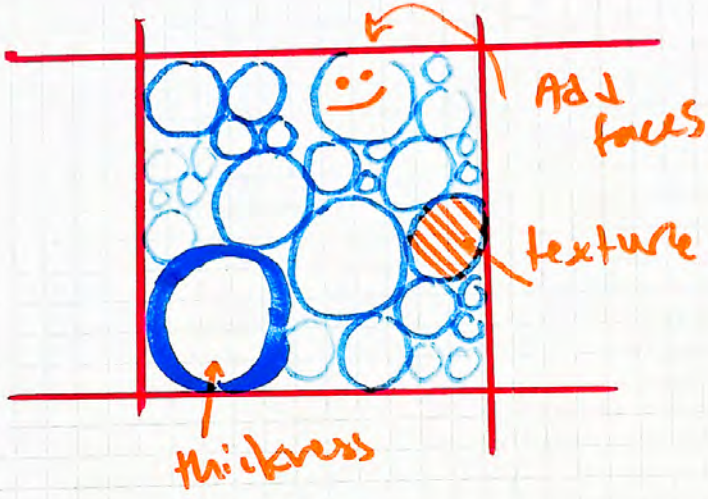
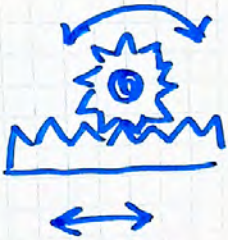
COGS 300 Movement 02 Jan 15/26

Warm up: Fill a space with circles.



translation
linear
prismatic

rotational



pinion

rack

axel

DC motor

Degree of freedom (DOF)

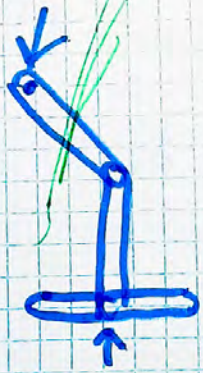
= 1 motor

end effector

working area

circle

2-DOF working area?



How many dofs in arm?

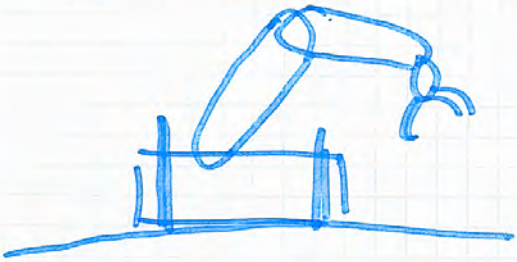
7

Robot : 6.

Grounded vs ungrounded.

↓

ambulating

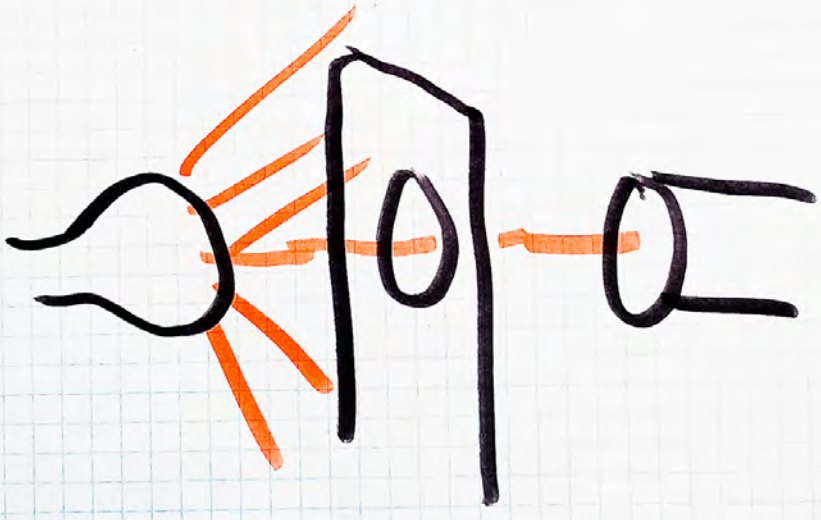


Design a pick + place robot

- pick from one side
- place on other side.

→ How does it navigate? → Error? → mitigation?

photo cell

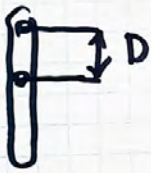


Looks like

Works like

every DOF needs encoder

liner

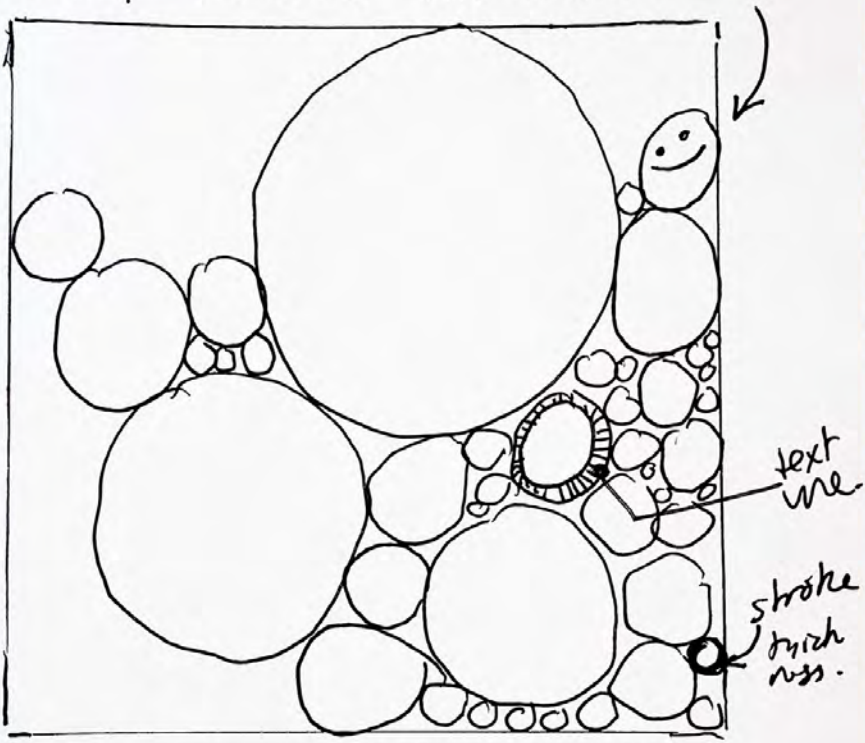


rotational

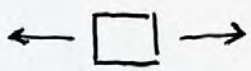
Reflection: What are the human body's encoders?
Rotational?
Liner?
Something else?

Movement 02

Warm up: circles. fill area. faces?



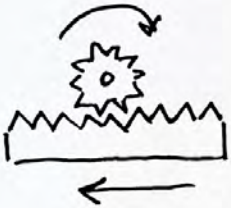
circles because today we talk about mechanics. Two types of robot motion:



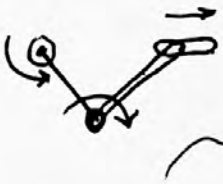
translation (prismatic) linear

rotation

These are interchangable + composable:



pinion + rack



pivot or free rotation.

Every motor is a "degree of freedom"

The end is an end effector
↳ "effects the world"

The working area of the robot is everywhere the robot can reach.

1-DOF : rotational:

100% linear:

★ What is the shape of the working area with 2-DOF RR:

figure out by tracing.

2-min ex. → circle.

★ How many dof for sphere? ★ Demo.

Not every config. equal. How many dof for arm? 7.

shoulder: 3
Elbow: 2
wrist: 2

↳ no fingers.

Robot arm is 6 because of cont rotation.

★ How many for a 3D printer? or claw machine?

↳ gantry robots

grounded vs ungrounded.

ambulating vs. stationary

you will make ambulating robots.
But some parts may be provided.

★ Design pick + place robot.

delivery from 1 end of table to other.

→ How does it navigate?
→ sources of error?
→ mitigation?

☆ Build photocell circuit.

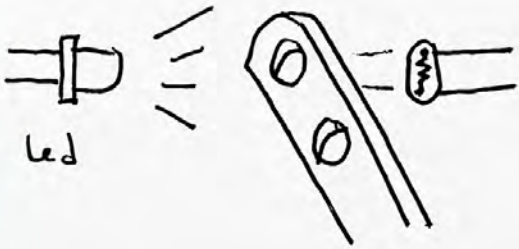
The photocell is the basis of a type of system called an optical encoder. It is a "distance" sensor.

you know three types of sensors now:

photocell pot switch

most systems use about this, where photocell stands in for some kind of distance sensing. The problem is how to merge them.

A linear optical encoder has issues that we exaggerate here, but even high-precision systems have the same issue, just smaller.



kill your magical thinking!

* redesign wire distance sensing uses your sensors.