Introduction to Robotics - Mid Sem

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Q2.

a) Using the hard gripper on the pills may be not a good idea because some pills are delicate(eg. capsules) and may break upon applying larger force. If we have to use hard grippers then the force applied on the pills have to be precise and different according to the pill. Soft grippers have a slight advantage in this situation. The soft gripper can pick up the pill of any shape and there is less chance of damaging the pill because of the soft material of the gripper.

b) Universal Gripper : Presenting the Universal Jamming Gripper
This gripper uses the jamming phenomenon of the powdered materials. We can use this type of gripper but it has to be of smaller size so that it can fit inside the cup.

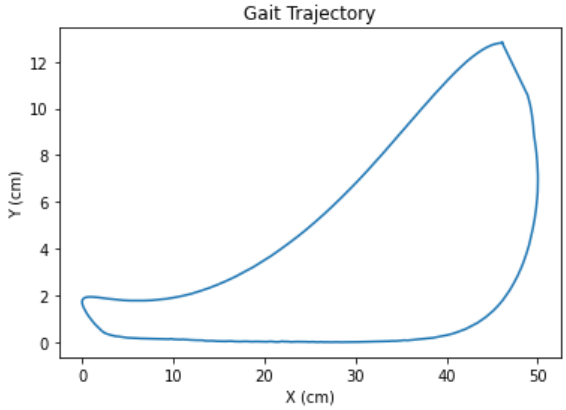
Origami Inspired Gripper: Origami Robot Gripper
This gripper is a soft origami folding gripper which can pick most of the objects. It is controlled by changing air pressure inside the gripper. But while using this gripper, there is a chance that the gripper may pick more than one pill at a time.

Q3.

a) Gait Trajectory : Gait trajectory means the trajectory of the foot of a human while normal walking. The gait trajectory defines the movement of the hip joint, knee and ankle joint while walking.
Step height : The highest point till the ankle reaches while walking is the step height.
Step Length : Step length is the distance covered by the ankle joint while in the air.

Suitable Link Lengths:
Hip Joint to Knee: 45 cm
Knee to Ankle : 44 cm

b) Gait Cycle Trajectory



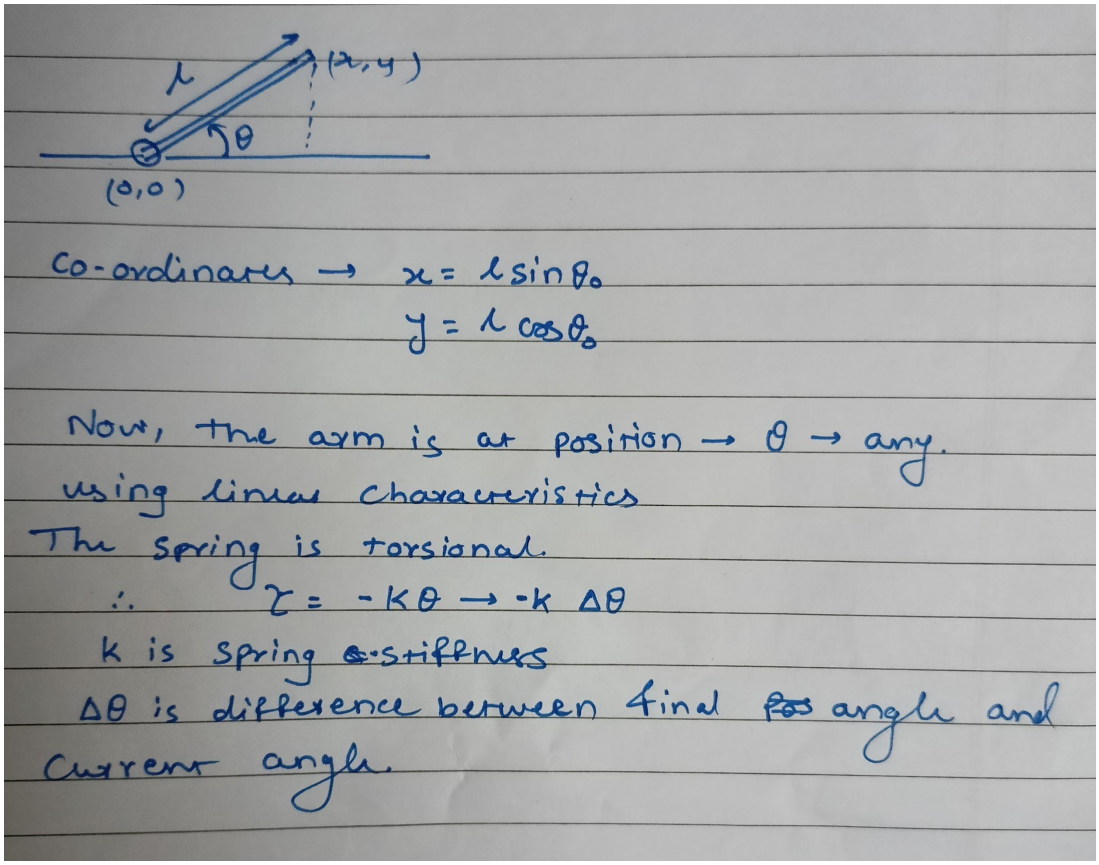
Q4.

a) As there is only one joint and link, there will be only one set for the DH Parameters

DH Parameters :

a	***α***	**d**	**θ**
l	0	0	θ_1

b)



Q5. Yes, all the joint rotations are considered as the rotations about the z-axis. ($\boldsymbol{\theta}$).

Q6. Yes, All the origins are at the center of the joints and then the axes are rotated and translated till they reach the centre of the next joint.

Q7. True, The rotation matrix can be identity and translation matrix can be zero, but both matrices are required for homogeneous transformation.

Q8. Yes

Q9. Yes