

Course outline

How does an NPTEL online course work?

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Week 7

Lecture 13 - Newton Euler Dynamics

Lecture 14 - Trajectory Planning

Lecture 14.1 - Inverse Dynamics using MATLAB

Week 7 - Lecture Notes

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# Assignment 7

The due date for submitting this assignment has passed.

Due on 2021-03-10, 23:59 IST.

As per our records you have not submitted this assignment.

1) The Newton-Euler Dynamics formulation is a

1 point

- energy based method
- position based method
- force based method
- velocity based method

No, the answer is incorrect.

Score: 0

Accepted Answers:  
force based method

2) In the Newton-Euler formulation, the outward iteration is for computing

1 point

- propagation of joint torques from base to end effector
- propagation of joint velocities from end effector to base frame
- propagation of joint torques from end effector to base frame
- propagation of joint velocities from base frame to end effector

No, the answer is incorrect.

Score: 0

Accepted Answers:  
propagation of joint velocities from base frame to end effector

3) In the Newton-Euler formulation, the inward iteration is for computing

1 point

- propagation of forces and torques from the last link to the base link
- propagation of joint velocities from end effector to base frame
- propagation of forces and torques from the base link to the last link
- propagation of joint velocities from base frame to end effector

No, the answer is incorrect.

Score: 0

Accepted Answers:  
propagation of forces and torques from the last link to the base link

4) Gravity is included in the Newton-Euler formulation by

1 point

- putting acceleration of base link equal to 'g'
- putting acceleration of base link equal to '-g'
- putting acceleration of last link equal to '-g'
- putting acceleration of last link equal to 'g'

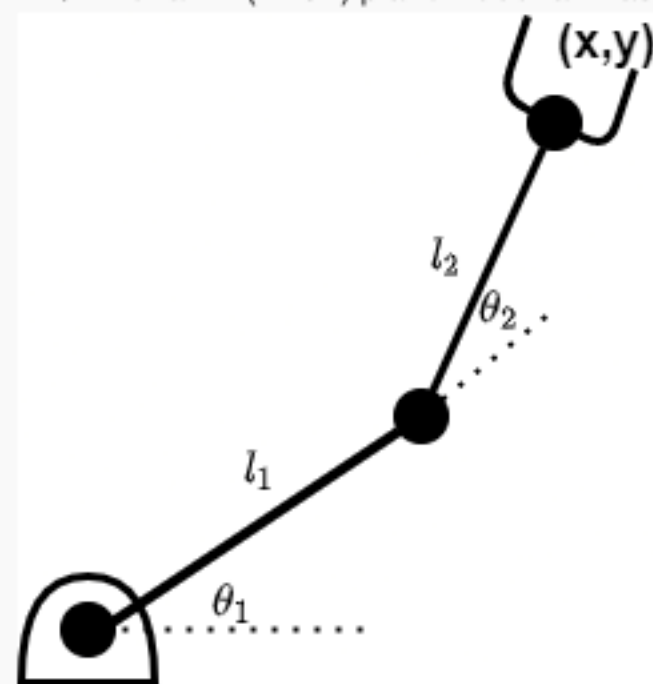
No, the answer is incorrect.

Score: 0

Accepted Answers:  
putting acceleration of base link equal to 'g'

5) For a 2R (2DOF) planer robot arm as shown below, the individual velocity of joint 1 is  $\dot{\theta}_1$  and joint 2 is  $\dot{\theta}_2$ . Then the angular velocity of joint 2 is

1 point



- $(\dot{\theta}_1 + 2\dot{\theta}_2)$
- $(2\dot{\theta}_1 + \dot{\theta}_2)$
- $\dot{\theta}_2$
- $(\dot{\theta}_1 + \dot{\theta}_2)$

No, the answer is incorrect.

Score: 0

Accepted Answers:  
 $(\dot{\theta}_1 + \dot{\theta}_2)$

6) Why can a physical robot link not follow a cubic polynomial trajectory?

1 point

- Velocity is not zero at time equal to zero.
- Acceleration is not zero at time equal to zero.
- Position is not zero at time equal to zero.
- Jerk is not zero at time equal to zero.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
Acceleration is not zero at time equal to zero.

7) In terms of computation efficiency which of the two methods of dynamics formulation discussed in this course is more efficient?

1 point

- Lagrangian Dynamic Formulation
- Newton-Euler
- Both are equally efficient
- Can't be said with surety

No, the answer is incorrect.

Score: 0

Accepted Answers:  
Newton-Euler

8) A trajectory is defined as

1 point

- a continuous connecting path between initial and final position of the end effector
- path traced by the links during free fall under gravity
- time history of position, velocity and acceleration
- a continuous connecting path between initial and final position of the end effector avoiding the obstacles

No, the answer is incorrect.

Score: 0

Accepted Answers:  
time history of position, velocity and acceleration

9) The polynomial used to model a trajectory should have order

1 point

- two
- three
- four
- five

No, the answer is incorrect.

Score: 0

Accepted Answers:  
three

10) Trajectory planning is done at the joint level to avoid

1 point

- computation complexity
- dynamic formulation
- inverse kinematics computations
- workspace singularity

No, the answer is incorrect.

Score: 0

Accepted Answers:  
workspace singularity