

Servo-sistema para perturbação controlada do equilíbrio postural

Mestrado Integrado em Engenharia Mecânica

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Problems

Generate repeatable balance disrupting stimuli to study phua's equilibrium

- Control 4 servos

- Use dynamixel sensors

Project a system that can be easily integrated in the motion capturing room at ESSUA

State of the Art

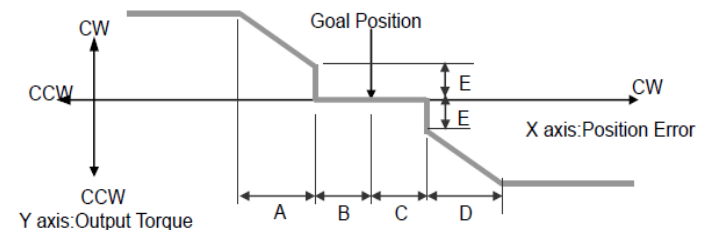
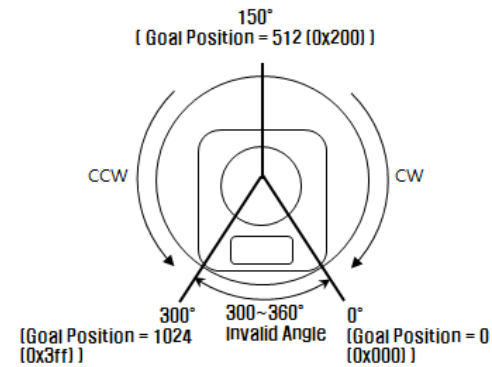
Dynamixel servos

Controllable parameters:

- Angle of operation
- Torque
- Compliance
- Position
- Speed

Readable parameters:

- Position
- Speed
- Load



A : CCW Compliance Slope(Address0x1D)
 B : CCW Compliance Margin(Address0x1B)
 C : CW Compliance Margin(Address0x1A)
 D : CW Compliance Slope (Address0x1C)
 E : Punch(Address0x30,31)

State of the Art

Analogy between an human and a biped robot
Static analysis



State of the Art

Analogy between an human and a biped robot
Dynamic analysis





State of the Art

Some balance disrupting tests:

<https://www.youtube.com/watch?v=NGzY9lh9Ycg>

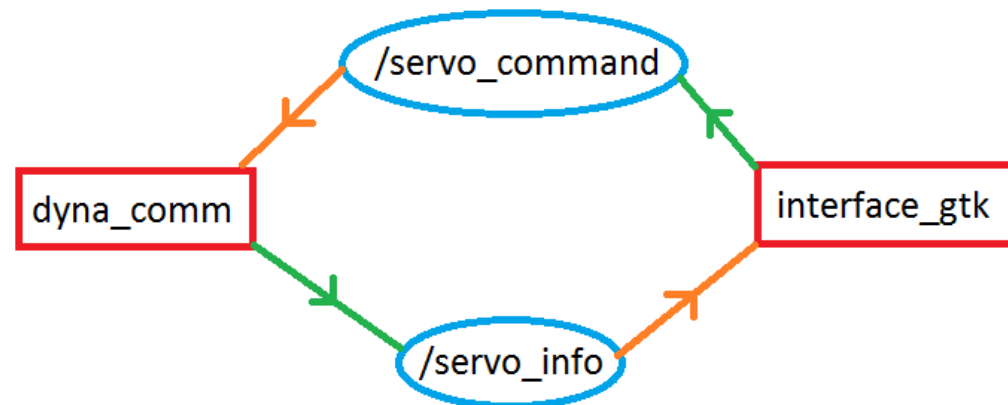
<https://www.youtube.com/watch?v=mclbVTIYG8E>

Developments achieved and tasks concluded

ROS package with two nodes

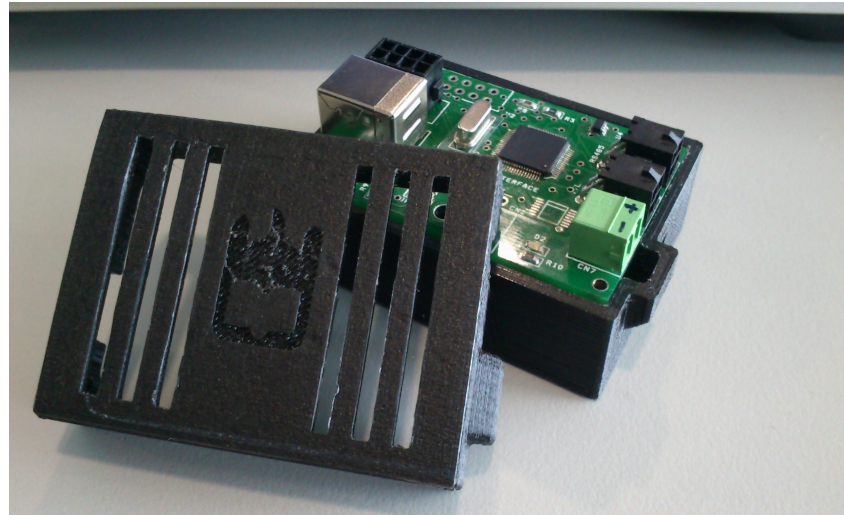
dyna_comm - communicates with de servos

interface_gtk - interface to control in real time some parameters



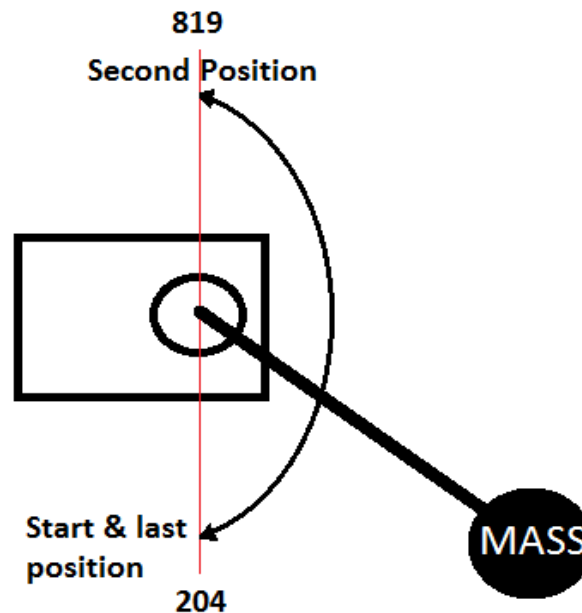
Developments achieved and tasks concluded

Protecting case for the dynamixel interface



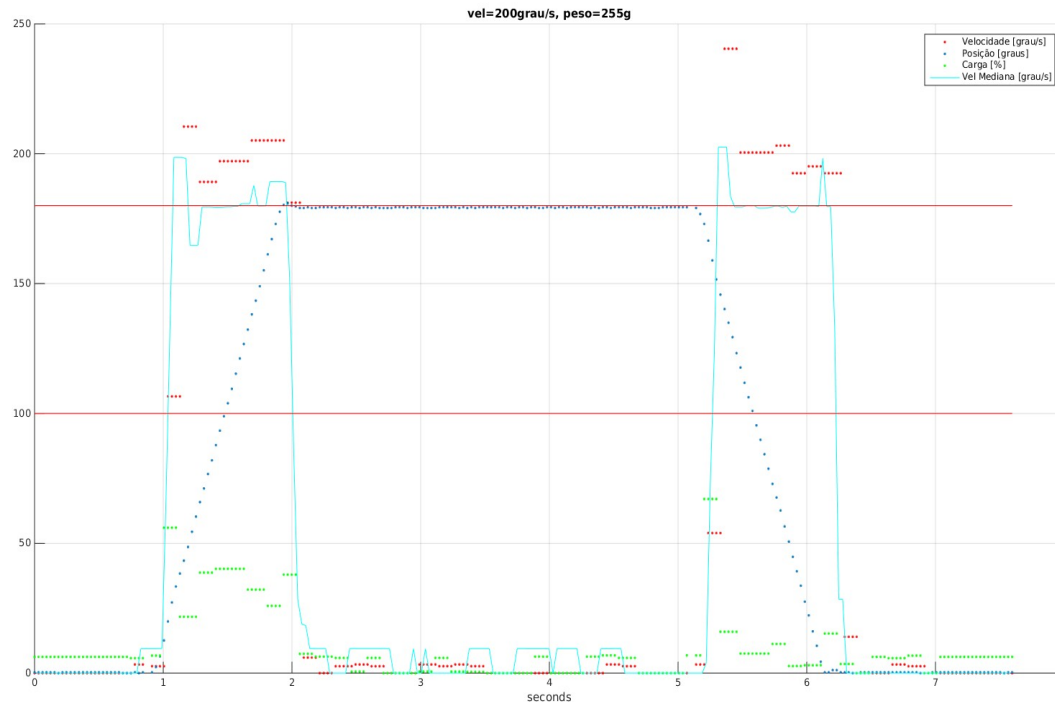
Developments achieved and tasks concluded

Experiments performed



Developments achieved and tasks concluded

Data gathered from the trials





Developments achieved and tasks concluded

Findings

Speed and load parameters are refreshed at 7.7Hz



Developments achieved and tasks concluded

Some other minor test to explore dynamixel control

Position control

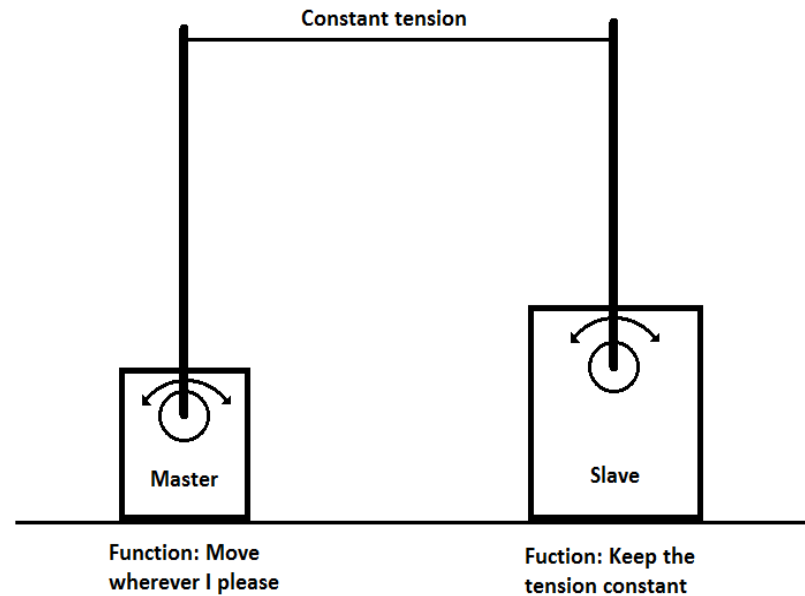
<https://www.youtube.com/watch?v=uh4P7UDW08Q>

Load control

<https://www.youtube.com/watch?v=4594MnbrKns>

Tasks and experiments ahead

Master-slave setup



Tasks and experiments ahead

Inverted pendulum

