

BEng(Mechatronic) Safety Report

Experimental Test of the Swinging and Balancing of the Robotic Gymnast

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Emergency Contacts:

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Pressure Vessels or Pipes: No pressure vessel or pipe with a pressure in excess of 50 kPa is involved in -
this project

Laboratory Technician (Henry Kotzé)

Supervisor (Dr. J.A.A Engelbrecht)

Laboratory Manager (Mr Cobus Zietsman)

Overview of Testing:

The feedback control system responsible for the swinging and balancing of the robotic gymnast is to be tested. The purpose of the tests is to determine if the controllers can swing the robotic gymnast from the stable equilibrium position (hanging downwards) to the unstable equilibrium position (balancing inverted).

The tests are required to test whether the model on a simulation program is a true representation of the physical model.

The equipment to be used is detailed as follows:

Equipment:
Bench Power Supply (max current of 3 A)
External Computer
G Clamps
Oscilloscope

General Lab Safety

The following general lab safety instructions are applicable:

- No afterhours testing may be performed without the necessary permissions.
- An induction is required before testing may be undertaken.
- Closed shoes must always be worn.
- Loose clothing may not be worn.
- Good housekeeping practices should be kept during testing.
- No food or drink is permitted in the lab.
- Extreme caution should be taken when working in the DIC lab as this lab houses sensitive optical equipment that may not be bumped, dropped or otherwise violently disturbed.
- Safety report must be visible and accessible during testing

Activity Based Risk Assessment

Activity	Risk	Risk Type	Mitigating Steps
Entering the laboratory	Injuring hand from door	P	Ensure hands are removed from the closing path of the door
Powering on the equipment	Electrical Shock	P	Inspect the condition of cable insulation and whether it is connected properly and to correct port.

Moving around in the laboratory	Falling over objects	P	Investigate the environment and be aware of objects on the ground
Mounting base with G-clamp	Crushing fingers	P	Ensure hands are out of the gripping direction of clamp
	Dropping the g-clamp	E	Be cautious when working with G-clamp
Swinging of Robotic Gymnast	Being strike by pendulums	P	Be outside the plane of rotation during tests. Enclosed test area with warning tape
	Pendulum striking G-clamp	E	Ensure G-Clamp is outside of the plane of rotation of pendulum
Inspecting hard stops	Being strike by Pendulums	P	Switch off all equipment and remove cables from ports
Inspecting Coupling	Being strike by Pendulums	P	Switch off all equipment and remove cables from ports
Balancing of Robotic Gymnast	Being strike by Pendulums	P	Be outside the plane of rotation during tests. Enclosed test area with warning tape
	Pendulum striking G-clamp	E	Ensure G-Clamp is outside of the plane of rotation of pendulum
Data acquisition	Data loss	P	Ensure the correct file format is selected
Tightening grub screw of shaft	Stripping the thread	E	Be cautious when tightening the screw to the shaft.
Inspecting the grub screw	Being strike by Pendulums	P	Switch off all equipment and remove cables from ports
Powering down equipment	Electrical Shock	P	Inspect the condition of cable insulation and whether it is connected properly.
Exiting the laboratory	Injuring hand from door	P	Ensure hands are removed from the closing path of the door