BEng(Mechatronic) Safety Report

# Experimental Test of the Swinging and Balancing of the Robotic Gymnast

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Supervisor: Dr. J.A.A Engelbrecht

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Laboratory Technician: Henry Kotzé

Emergency Contacts:

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| **Ambulance** | - | 021 883 3444 | - |

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

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Laboratory Technician (Henry Kotzé)

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Supervisor (Dr. J.A.A Engelbrecht)

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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:

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| **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**

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| **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 cautions 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 |