

FYP: Development of Biped Robot Gait

Laboratory of Motion Generation and Analysis
School of Mechanical and Aerospace Engineering
Monash University

Background

Biped robots are superior to other robots in many situations due to their adaptability to the environment. For example, a biped robot can be used as a disaster response unit when the field is too dangerous for human and cannot be access by wheeled robots. Dynamic stability is important in gait generation of biped locomotion. Zero Moment Point (ZMP) is a common approach for the gait generation of biped robot. Utilising Inverted Pendulum Mode (IPM) and the ZMP, one can generate a robotic gait while maintaing the stability of the robot [1]. Several trajectory generation methods have been developed such as Gravity Compensated Inverted Pendulum Mode (GCIPM) and Multiple Mass Inverted Pendulum Mode (MMIPM). However, most researches only considered over-simplified models due to the complexity of the dynamic system [2].



Figure: Nao Bipedal Robot [Aldebaran Robotic]

Objective

The objective of this project is to develop a method to generate dynamically stable gait for biped robot considering the full dynamics of the robot. The method based on ZMP will be utilised. The computational tools include MatLab and MuPad.

Requirements

One student in Mechatronics, Mechanical, or Aerospace

Contact

Dr Chao Chen: chao.chen@monash.edu

References

- [1] Kajita, S. et.al. 2001, The 3D Linear Inverted Pendulum Mode: a Simple Modeling for Biped Walking Pattern Generation, Proceedings of the 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp 239-246.
- [2] Taskira, E. et.al. 2010, Trajectory Generation with Natural ZMP References for the Biped Walking Robot SURALP, Proceedings of the 2010 IEEE International Conference on Robotics and Automation, pp 4237-4242