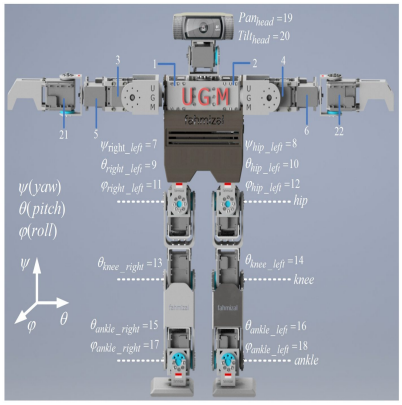


Humanoid Robot

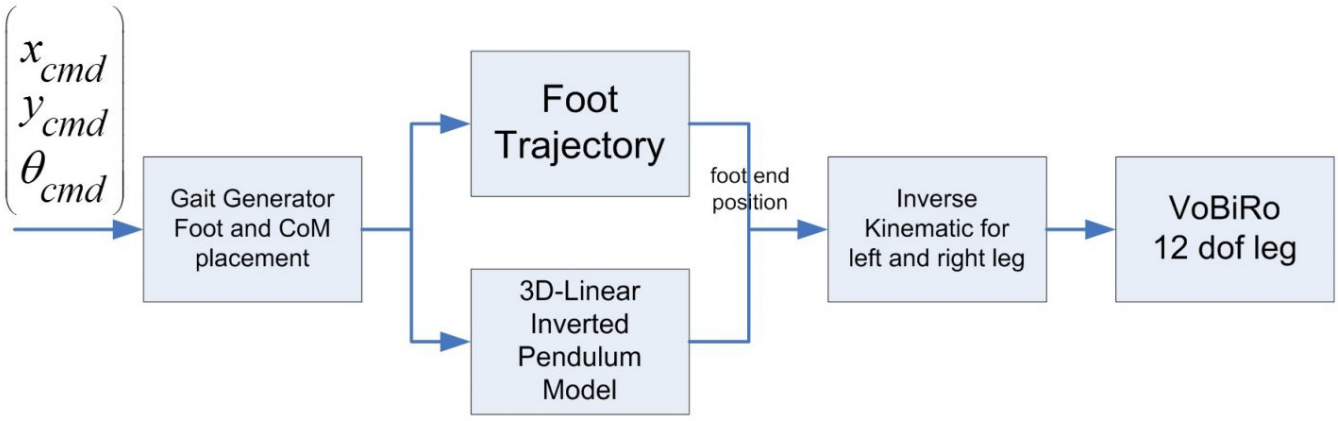
Description

VoBiRo – Vocational Bipedal Robot Platform, Kinematic and Locomotion Control

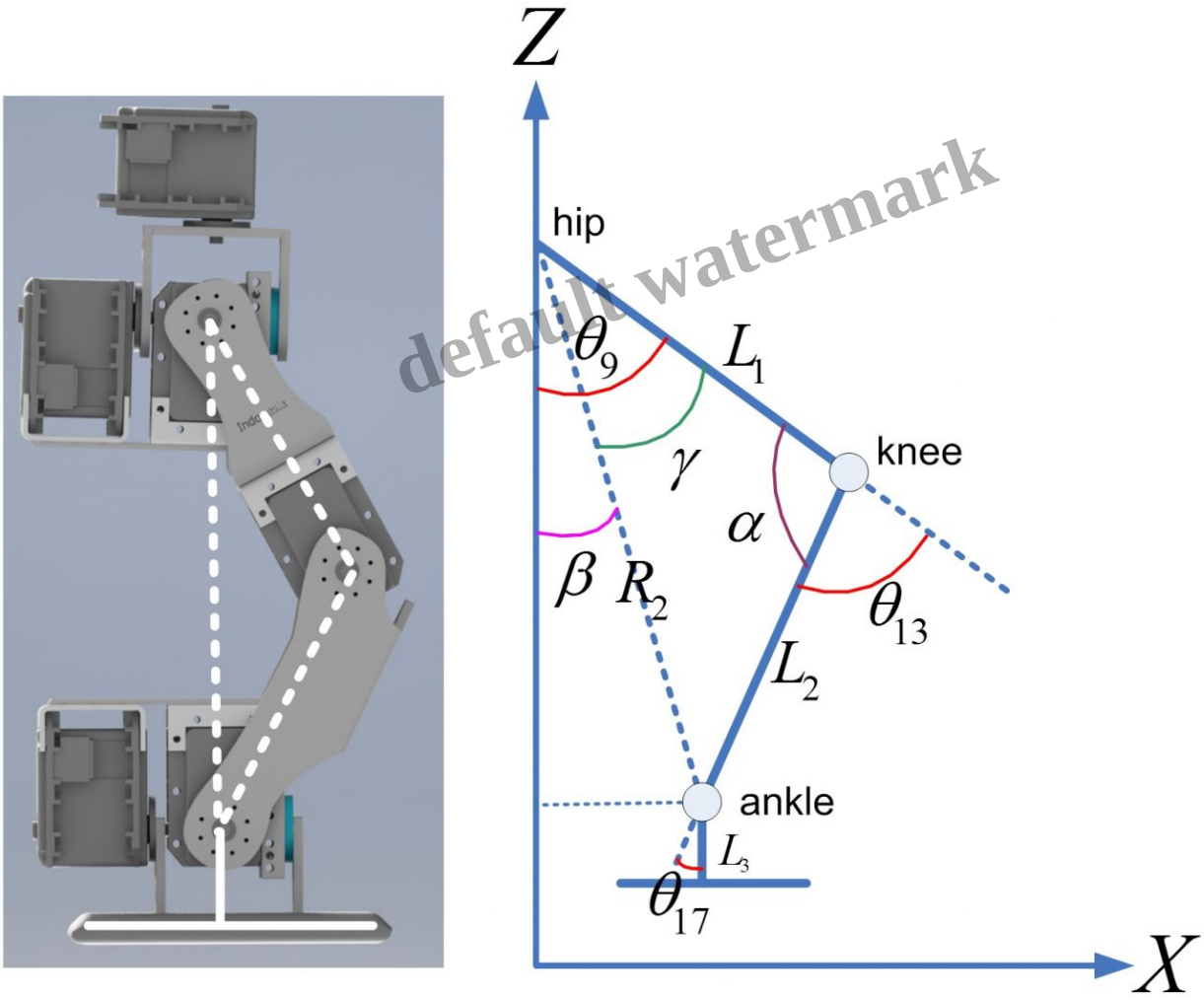
Abstract

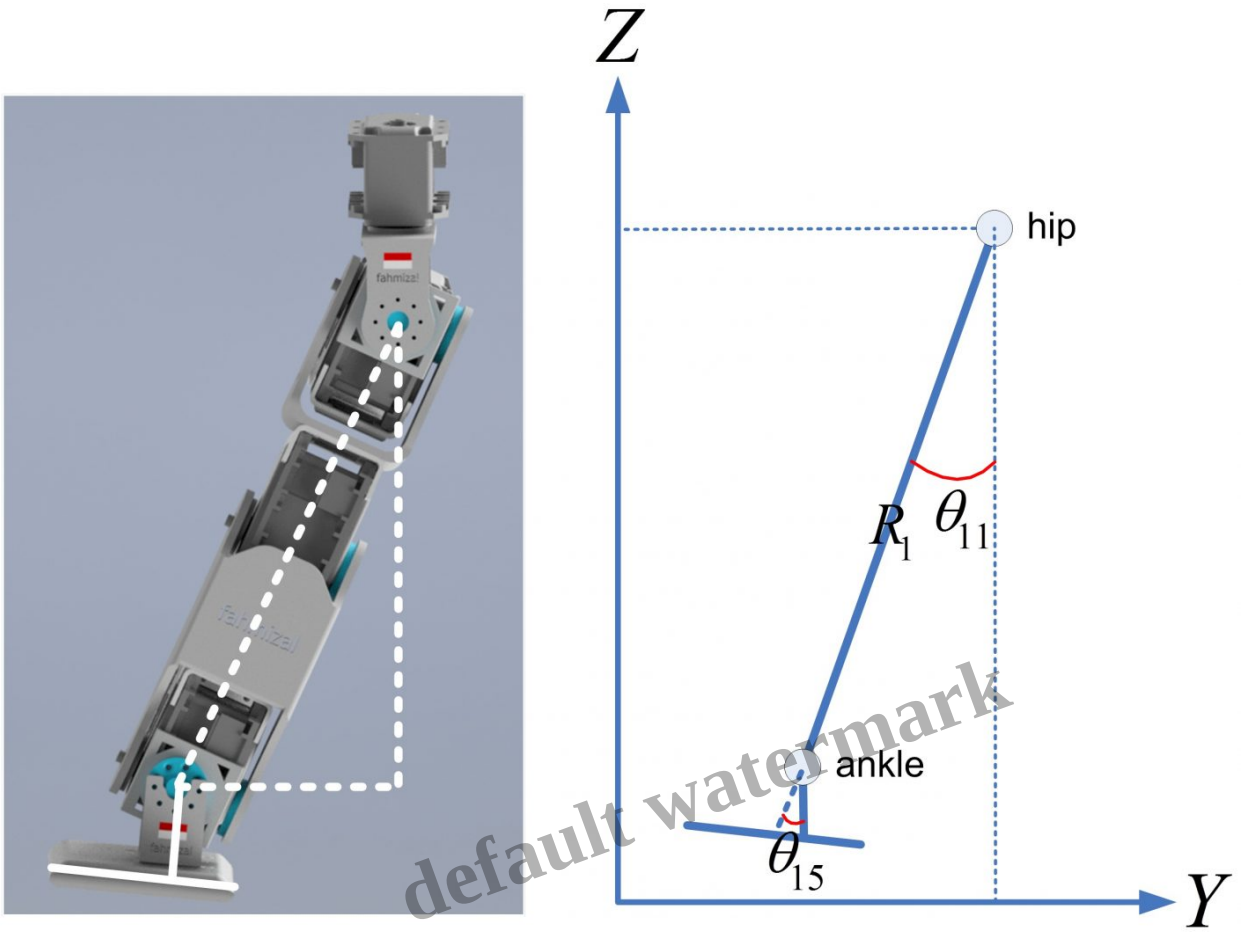
This research presents kinematic and locomotion control of vocational bipedal robot (VoBiRo)with a kid-size platform. Typically, a linear inverted pendulum model (LIPM) can be used to generate the center of mass (CoM) trajectory of a bipedal robot. By combining the swing foot trajectory, the omnidirectional walking command is capable of generating joint angle control commands in terms of kinematic. Thus, this paper proposes kinematic and LIPM as a locomotion control VoBiRo. A complete simulation was then implemented in MATLAB and graphical user interface (GUI) by Processing IDE relying on kinematic and LIPM model.

Locomotion Control of Bipedal Robot

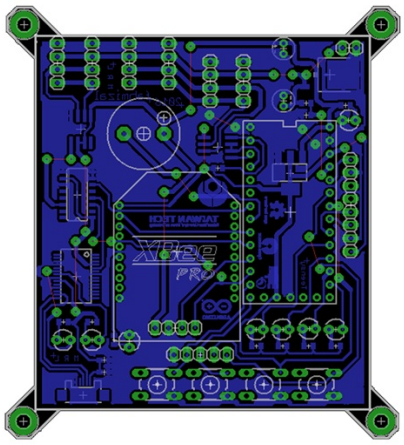


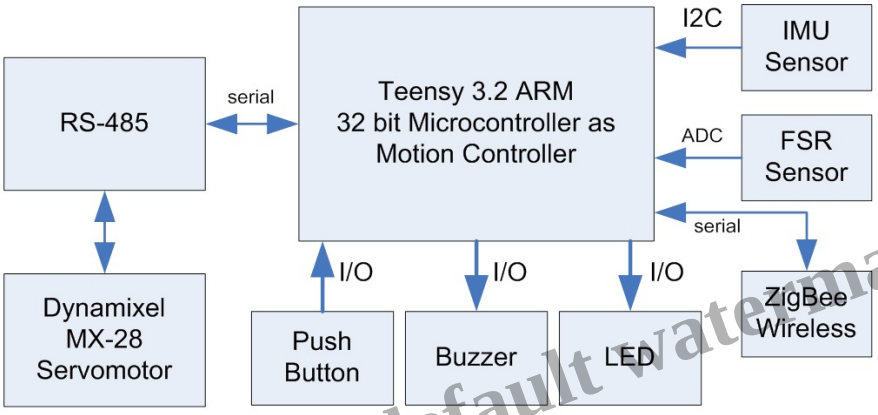
Inverse Kinematic





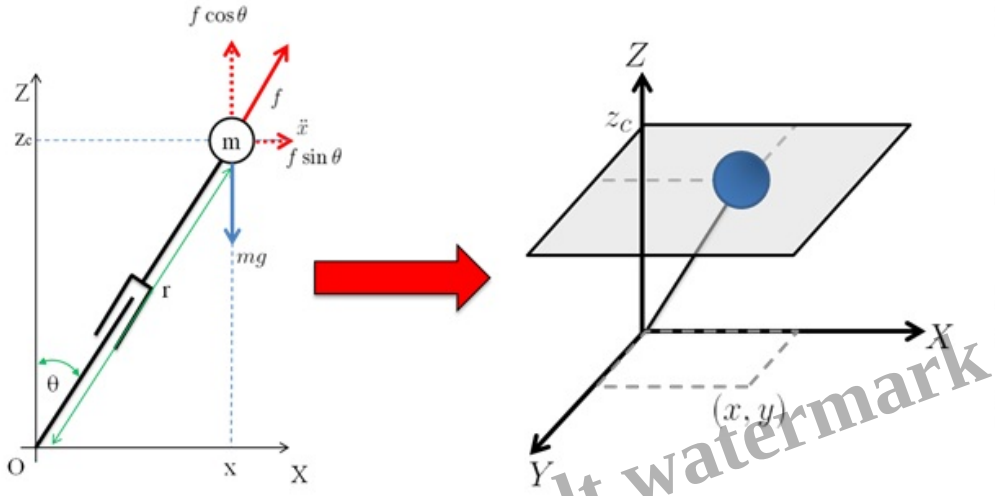
Electronic design of VoBiRo





Locomotion Control of Bipedal Robot

Three Dimensional Linear Inverted Pendulum Model



$$\ddot{x} = \frac{g}{z_c}x \begin{cases} x(t) = x(0)\cosh(\frac{t}{T_c}) + T \\ \dot{x}(t) = \frac{x(0)\sinh(\frac{t}{T_c})}{T_c} + \dot{x}(0 \end{cases}$$

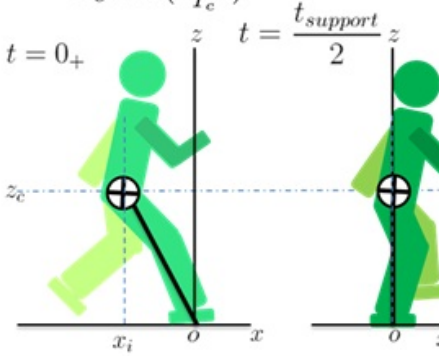
$$\ddot{y} = \frac{g}{z_c}y \begin{cases} y(t) = y(0)\cosh(\frac{t}{T_c}) + T_c \\ \dot{y}(t) = \frac{y(0)\sinh(\frac{t}{T_c})}{T_c} + \dot{y}(0) \end{cases}$$

$$x_f = x_i \cosh(\frac{T_{sup}}{T_c}) + T_c x_y \sinh(\frac{T_{sup}}{T_c}$$

$$x_f = -x_i$$

$$v_x = \frac{x_f + x_f \cosh(\frac{T_{sup}}{T_c})}{T_c \sinh(\frac{T_{sup}}{T_c})}$$

Kajita, S., Kanehiro, F., Kaneko, K., Yokoi, K. and Hirukawa, H.,"The 3D Linear Inverted Pendulum Mode: A simple modeling for a biped walking pattern generation". In Intelligent Robots and Systems, 2001. Proceedings. 2001 IEEE/RSJ International Conference on IEEE, 2001



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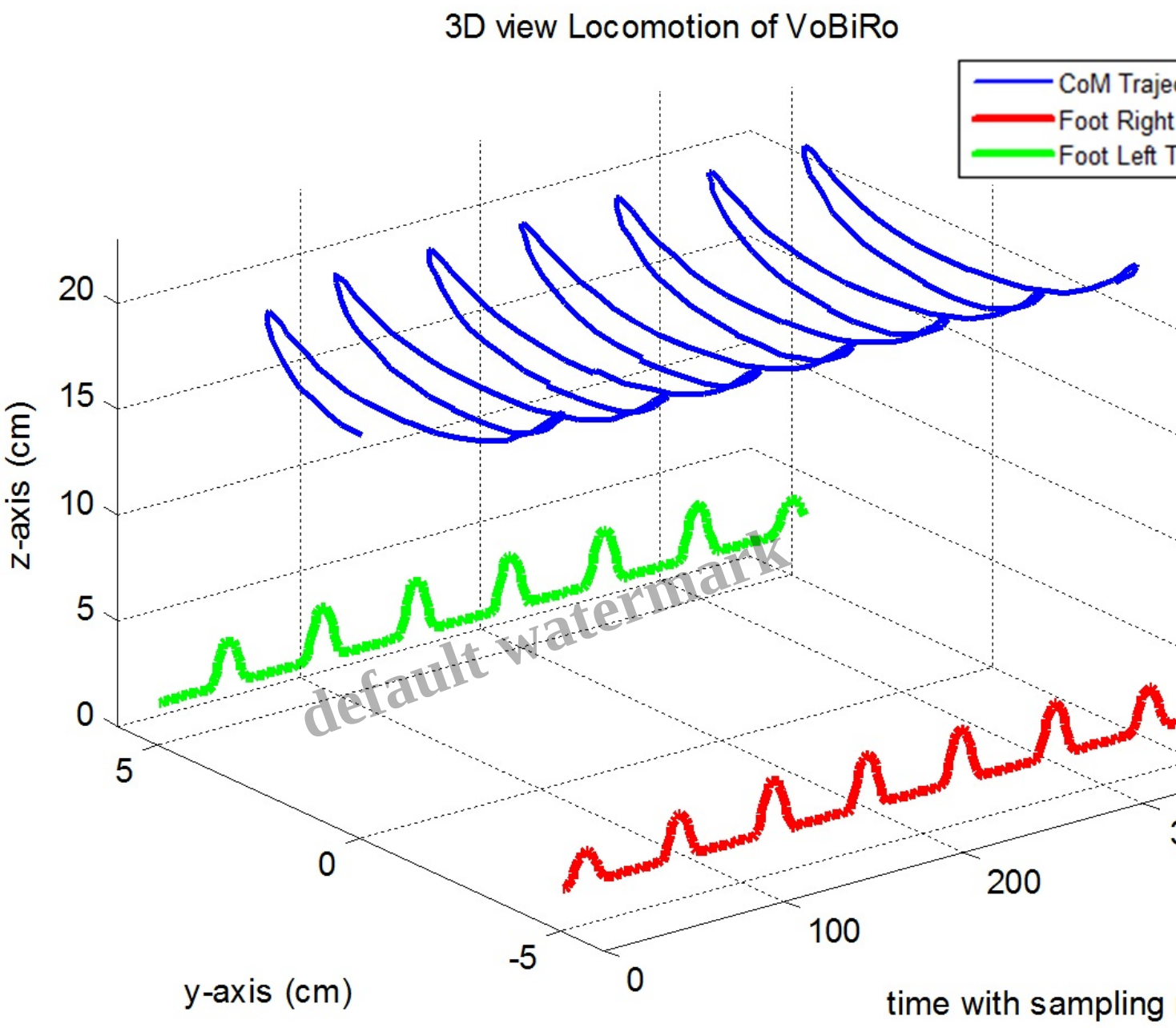
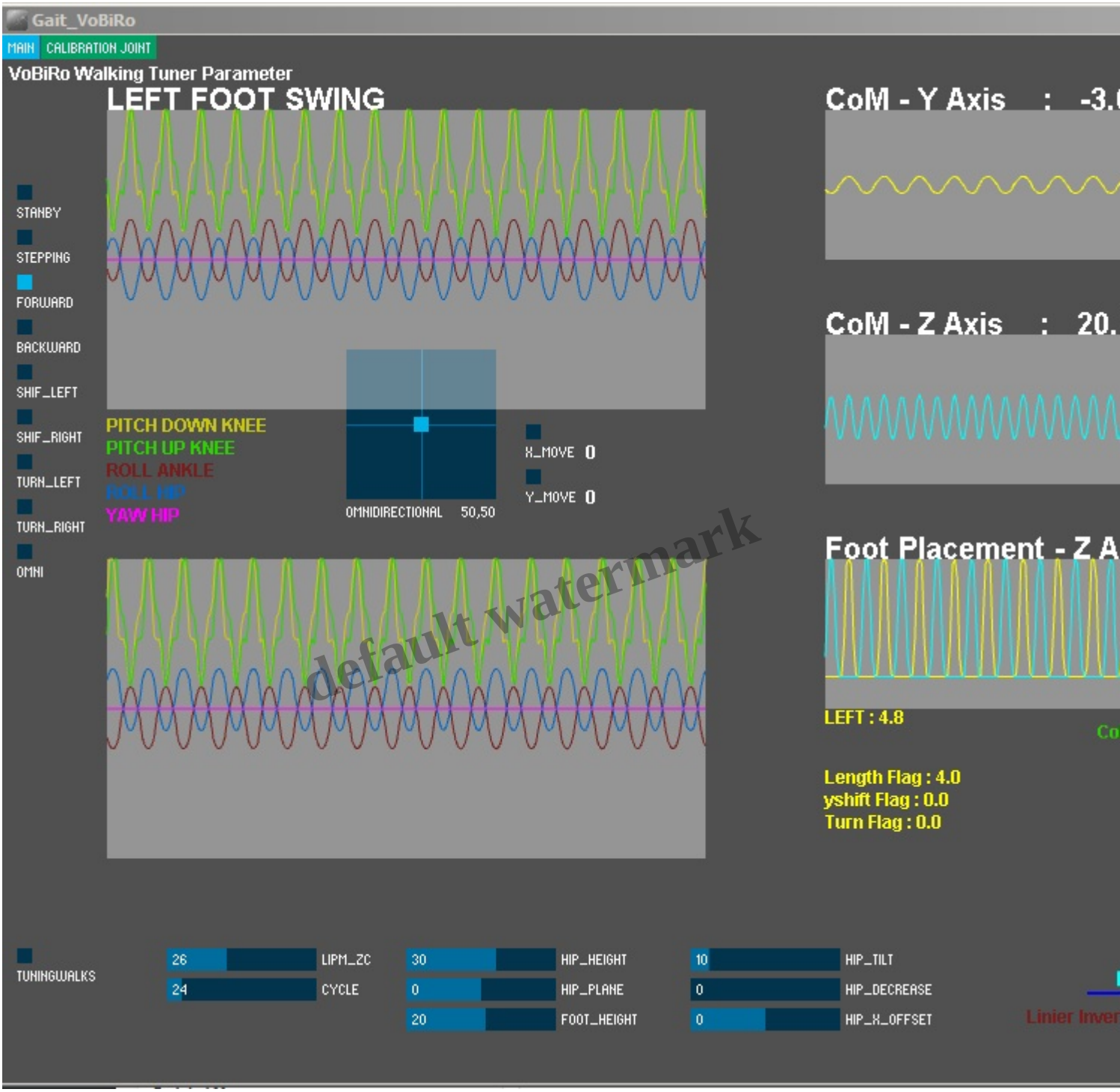
3D View Locomotion of VoBiRo



Graphical User Interface (GUI) of VoBiRo



http://otomasi.sv.ugm.ac.id/wp-content/uploads/sites/361/2019/01/VoBiRo.mp4

more detail visit our publication here and our ppt

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