

A. Omer, H. Lim, A. Takanishi. *Simulations for elderly support walking device with humanoid robot. Gerontechnology 2008; 7(2):179.* Due to growing aged society in Japan there are an increasing demand for development of rehabilitation instruments. The Waseda Bipedal Humanoid Robot WABIAN-2R has been developed to simulate human motion<sup>1</sup>. It is capable of performing human-like movement and walking with a walking support device. However, further development of WABIAN-2R pushing walking support devices could be risky because the external forces produced by the support devices affect the robot motion. Therefore, a dynamic simulator is needed for human safety, the evaluation test cost of support machines and easy data monitoring and measurements. Using the dynamic motion simulator, the robot walking motion with the walking device can be easily checked before proceeding to hardware experiments. **Methods** We have developed a dynamic walking motion simulator using the Webots simulation software<sup>2</sup>. First, we model the 3-D structure of WABIAN-2R and create the controller which controls the simulation system. This simulator uses the same walking motion patterns that used in the real WABIAN-2R. Moreover, all the measurement data could be outputted during the simulation. In the simulation, the system can be modified to have better results. The robot walking with the walk-support device will be unstable because they use a different controller. To improve the stability of walking, the control system of the walking support machine is developed. The velocity of the walk-assist machine is adjusted according to the force applied by the robot on its arm rest<sup>3</sup>. **Results and discussion** The 3-D walking motion simulation of WABIAN-2R that is pushing a walk-support machine was performed and the effectiveness of the simulation algorithm was confirmed. A velocity control method was employed for improving walking stability of the WABIAN-2R model when the walk-support device was activated. Using the simulation algorithm, we can test the function of several different types of walk-assist machines.

#### References

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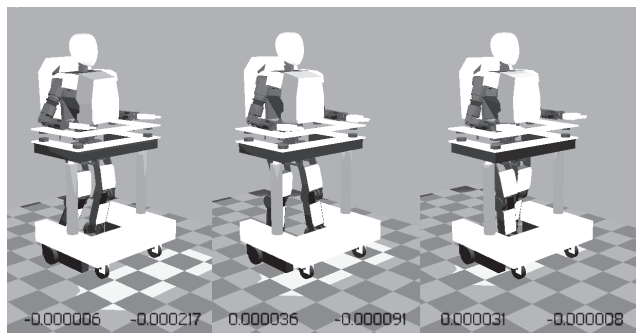


Figure 1 Simulation of walking with the walking support machine using velocity control