

C. Pei, W-M. Chi, C-H. Huang. *Design and pilot test of an adaptable walker for slopes and stairs*. *Gerontechnology* 2009;8(2):117; doi:10.4017/gt.2009.08.02.016.00 Walkers may support the mobility of a person with lower limbs disability or poor balance. Users need good upper limbs function. In Taiwan, 47% of common assistive devices are walkers and canes; but users have a higher risk of injury or fall than those in wheelchair¹. The regular walker in Taiwan is without wheels; it often causes users to lose balance and fall. This is partly because they cannot keep the body central line and the body centre of gravity line parallel while they walk on slopes with the regular walker; moreover, they do not provide supporting points for walking on stairs². We developed and evaluated a topography adaptable walker that helps the user overcome slopes and stairs. **Technical description** (i) On slopes: when the user walks with the topography adaptable walker, the user just adjusts the handles' angle by holding the handle switches to keep the handles horizontal, keeping balance with the normal walking position on slopes² (Figure 1a) (ii) On stairs: the topography adaptable walker provides two supporting plates which enables a firm stability for walking on stairs² (Figure 1b). **User studies** There are three phases in development: (i) the concept design (Figure 1), (ii) the prototype manufacturing (Figure 2), and (iii) the pilot test for functional assessment of the prototype (Figure 3). The pilot test has three main procedures: (a) Comparison of gait between the regular and the new walkers using the Vicon motion analysis system as well as the biomechanics analysis system (Figure 3), (b) Calculation of the WURI (Walker User Risk Index)³ of new and the regular walkers, and (c) Modification of the new walker from the experiment results. Currently, we are working on the second procedure of phase iii.

References

1. Hu MH. Usage Survey of Locomotive Assistive Devices for Long-Term Care Clients. *Formosan Journal of Physical Therapy* 2004;29(6):405-420
2. Wang JY, Pei C. Design of a Topography Adaptation Walker. *The International Conference on Gerontic technology and Service Management Conference, ROC; 2007*
3. Pardo RD, Deathe AB, Winter DA. Walker user risk index. A method for quantifying stability in walker users. *American Journal of Physical Medical Rehabilitation* 1993;72(5):301-305

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Figure 1. Phase a Concept Design: The topography adaptable walker, (a) on slope; (b) on stairs

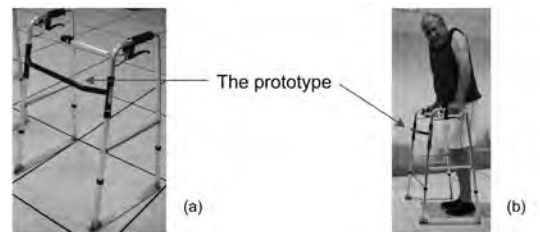


Figure 2. Phase b Concept Design: the prototype manufacturing. (a) the prototype; (b) the older user

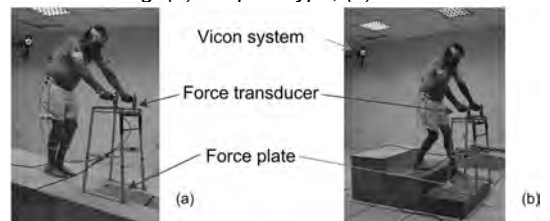


Figure 3. Phase c new walker's functional assessment. (a) on slope; (b) on stairs