

Abstract

Due to its mobility, light-weight and battery-operated features, notebook computers (NBC)s are getting very popular. Reducing costs and good marketing strategies are promoting people to use NBC more than Desktop Computers (DPC)s. However, a tradeoff from using NBC is the fact that due to its non-ergonomic design, the base-unit connected with the screen-unit with a hinge, prevents it to adjust the screen and the base independent of each other, which results into a bad posture for NBC users. NBC related musculoskeletal disorders (MSD) are increasing but at the same time the trend for NBC usage is increasing too. Various researches have been carried out to recommend good ergonomic posture. A quantitative guideline for NBC usage has not been provided. This research provides two algorithms for recommending notebook computer (NBC) and workstation adjustments so that the user can assume an ergonomic seated posture during NBC operation. Required input data are the user's anthropometric data and physical dimensions of the NBC and the workstation. The first algorithm is based on an assumption that there are no workstation constraints while the second algorithm considers the actual seat height and work surface height. The results from the algorithms include recommendations for adjusting the NBC (tilt angle of the NBC base unit, angle between the base and screen units, and base support height) and the workstation (heights of seat support and footrest, and distance between the body and the NBC). Based on the algorithm a decision support system, *PostureAdjuster* has been developed. *PostureAdjuster* consists of databases, computing algorithms, and user-system interface. Body dimensions, NBC dimensions, NBC angles, NBC-body distance, workstation dimensions, and seat adjustability are the input data needed for computing the work posture. *PostureAdjuster* is able to compute current work posture based on the given data, and recommend ergonomic work postures both with and without workstation constraints. The computed results include body joint angles, viewing distance, incidence angle, NBC – body distance, NBC settings (and support), and workstation settings (and supports). A graphical display of body posture is also shown. The results can be shown on-screen and printed out as hardcopy. RULA Analysis can also be performed using *PostureAdjuster* by manually selecting the inputs from an image. These three features, (i) namely evaluating a current work posture, (ii) recommending ergonomic work posture and (ii) calculating RULA score were validated by testing on 12 subjects and two different workstations. The validation results showed significant improvements in body posture of subjects and reduction of perceived discomfort from subject's opinion, consistent RULA score calculation but the evaluation of a current work posture had some inconsistencies, which could be perfected by further research.