Research Project

Home-Office Assistance System

Description

The Professorship of Digital- and Circuit design (DST) is working on the topic of Home-Office Assistance system in which we are estimating different health vital parameters which will assist users to know more about their health while working Home-Office. The idea behind the topic is to capture images of the users from frontal and lateral positions. Using this images, various vital parameters from the face and body are to be calculated. Figure 1 shows the wrong and correct sitting postures from the lateral view using which spine angles are to be calculated.
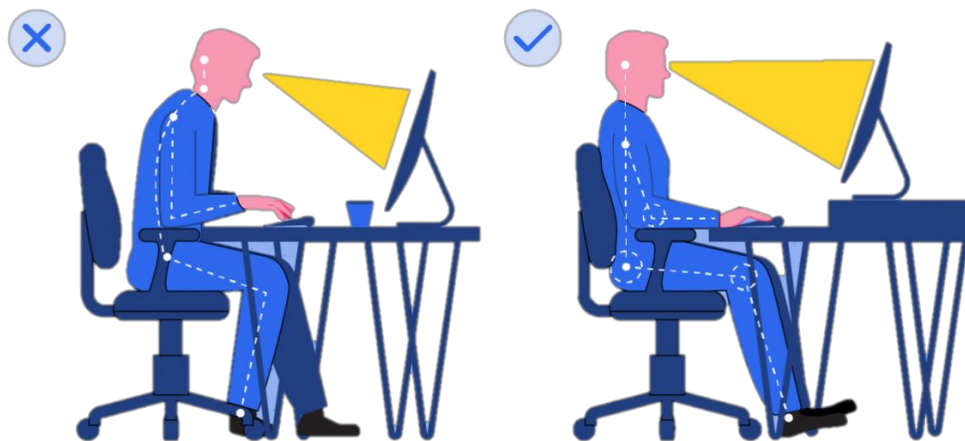

Figure 1: Lateral view of user working in Home-Office Set-up [1]

The student's work isn't limited to this work but should at least do the following steps:

- Getting to know and calibration of the dual camera set-up
- Running two cameras simultaneously with same frame rates
- Calculation of at least two parameters from Frontal or Lateral View (Respiration Rate, Blink-rate, Blood Pressure, Heart Rate and heart-rate variability, Oxygen Saturation, posture angle, posture pattern ..)

Recommended experience

- basic understanding in computer vision
- knowledge in at least one programming language (preferably Python or C++)

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Literature

[1]   T. Russell, "Computer Vision Syndrome: The Square Eyes Nana Warned You About." Greatist, May 2021. Available: https://greatist.com/health/computer-vision-syndrome

[2]   J. Klamm and K. G. Tarnow, "Computer vision syndrome: a review of literature," *Medsurg Nursing*, vol. 24, no. 2, pp. 89–93, 2015.

[3]   M. Ouchi, S. Yokota, A. Matsumoto, D. Chugo, and H. Hashimoto, "Seated Posture Estimation of a Visual Display Terminal Worker using Single Web Camera and Iris Diameter: Report on the preliminary experiment," in *2019 12th International Conference on Human System Interaction (HSI)*, 2019, pp. 248–252. doi: 10.1109/HSI47298.2019.8942637.

[4]   M. Divjak and H. Bischof, "Eye Blink Based Fatigue Detection for Prevention of Computer Vision Syndrome." in *MVA*, 2009, pp. 350–353.

[5]   C. Massaroni, D. S. Lopes, D. Lo Presti, E. Schena, and S. Silvestri, "Contactless monitoring of breathing patterns and respiratory rate at the pit of the neck: A single camera approach," *Journal of Sensors*, vol. 2018, 2018, doi: 10.1155/2018/4567213.