

Development of an Automatic Transcription Algorithm for Basic Human Movements

Keywords: Virtual Reality, Manual Work

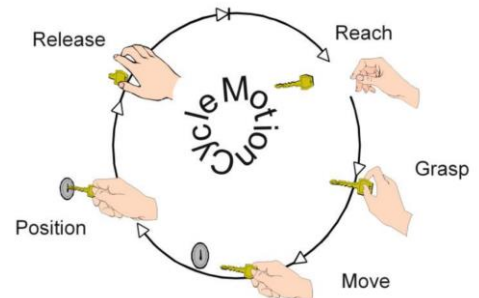
Overview

In spite of a high degree of automation, industrial production still heavily relies on manual work, in particular for assembly tasks. To perform such manual tasks in a time and cost efficient way, manual workplaces need to be highly optimized. In particular for mass production, the correct placement of components and tools guarantees an efficient and ergonomic manual work process. In order to compare different configurations of workplaces, industry established a method to measure and analyze manual work. However, applying this method requires to have the real workplace, at which the worker can interact. His movement is then manually transcribed in order to achieve measure for a later comparison of different workplace configurations.

To overcome the drawback that only existing workplaces can be investigated, recent approaches started using virtual representations instead. However, the drawback of manually analyzing human movements still exists.

Goal of the Thesis

The goal of this thesis is to develop a first concept and prototype for an automatic transcription of human movements such as reach, grasp, move, position, and release. In order to ease the detection of human movements, also position changes of virtual objects should be taken into account.



Tasks

Your work will start with a literature research on body pose estimation and classification and on basic principles for manual work place evaluation. Next, you will become acquainted with the Virtual Reality software “Unity” and how to read out positional data of the tracking system and from virtual objects. Based on this data, you will develop and implement a first concept to detect basic motion elements. The resulting algorithm will then be evaluated in a user study employing the given real and virtual environment. Finally, you summarize your findings in a written report, and present them in an intermediate and final presentation.

Workpackages

- Literature research on body pose estimation and classification and on basic principles for manual work place evaluation
- Become acquainted with the Virtual Reality software “Unity”
- Become acquainted with tracking data readout
- Develop and implement a classification algorithm for basic human motion elements
- Design user study setups that can be realized in reality and virtual reality as well
- Planning and conduction of a user study
- Data evaluation
- Intermediate and final presentation
- Written report

Skills

- Programming Skills in C++ or C#
- Unity and/or VR experience is a plus
- Strong communication and interpersonal skills

Results

The results of this thesis need to be summarised in a written report and will be presented to the ICVR in a 20min talk.

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