論文審査の要旨および担当者

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（論文審査の要旨)

The thesis is on the topic of cognitive state assessments in the Wild (real world environments). The work presented by the candidate focuses on developing unobtrusive sensing approachs, that allow for continuous cognitive state assessment in everyday life.

Mr. Benjamin Tag presents several studies where he collects psychophysical signals from a smart eyewear equipped with sensors for measuring eye movement and eye blink. He also applies infrared cameras and sensor to obtain measurements of changing facial temperature. His goal is to automatically infer states of alertness, sustained attention, and cognitive engagement with unobtrusive wearables allow for the development of new adaptive user interfaces and a new direction of cognitive activity recognition.

Overall, his contributions are strong in technical terms (cognitive state sensing, algorithms, user studies) as well as in the design area (discussing alternative approaches, potential use cases, applications and guidelines for technology usage).
The thesis is clearly structured and easy to follow. Chapter 1sets the motivation, foundation and related work. Chapter 2 goes into details which physiological signals are used and why for the alertness and cognitive load studies. Chapter 3 is then the main content, describing several studies related to facial thermography and EOG based blink detection and fatigue recognition.

The thesis draft needed a little improvement in clarity and description. As fatigue and alertness measurements are well established in psychology a more in-depth discussion and comparison to those methods is required: making clear the advantages and uniqueness of his approach. Another small change involves the thermal studies presented in the paper, here Mr. Benjamin Tag could answer perfectly the reasons and rational behind the studies and their consecutive order, yet the draft was still lacking. The revised thesis version already addresses both points and contains an extended comparison to traditional approaches as well as a better rational for the thermal studies.

The thesis underlines that Mr. Benjamin Tag has exceptional academic skills. From his work it is visible that it takes him very little time to absorb new knowledge and apply it. Although his background is linguistics, the work he presents in his thesis is well published in the computer science fields of ubiquitous computing and human computer interaction. Most astonishingly, he was able to publish the major results of his thesis at The ACM CHI Conference on Human Factors in Computing Systems 2019. CHI is the premier international conference of Human-Computer Interaction with acceptance rates under 20 %. This shows away from other contributions the impact the thesis has. The thesis contributions are well published with over 12 paper publications (2 full papers), this in addition to the very positive reception of the thesis from the review committee shows the value and impact of the work in several academic fields.