

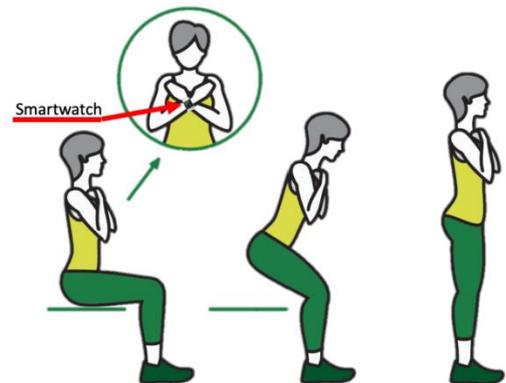
# Master-Thesis:

## Using Smartwatches for Measuring the Impact of Blue-Enriched Lighting on Physical Activity

In this Master-thesis project, the impact of blue-enriched lighting on the physical performance abilities of human beings should be evaluated. For this purpose, the spectral composition of an LED light source, to which subjects are exposed continuously, is varied from a Planckian-like distribution to a blue-enriched emission showing the same illuminance level, while the subjects' physical activity is tracked and monitored using a last-generation smartwatch in combination with an ECG chest strap as a monitoring and data acquisition device.

The performance task that has to be fulfilled by the subjects is a variation of the standard 30 Second Chair Stand Test (30CST) shown on the right. After being exposed to one of the different lighting situations to be tested for about 30 min, during which both an acoustic reaction time task and a psychological questionnaire assessing the current state of mood and alertness have to be conducted, the subjects' challenge is to complete as many full standups from a sitting position as possible within 30 seconds.

Heart rate, skin temperature and dynamic acceleration are monitored by the combined system of smartwatch and chest strap device with the aim of finding a correlation between the subjects' physical performance and the lighting condition under consideration. In particular, both the acceleration data as well as the time needed to recover from physical exertion until the starting condition in the monitored signals is re-achieved could be a measure for the subjects' initial state of alertness caused by the different lighting conditions and illuminance levels that should be investigated in this study. A correlation with the subjective questionnaire ratings can be hypothesized and should also be evaluated.



Student candidates should have a certain knowledge and interest in signal processing, statistics and programming (for running the test protocol and data collection, an application for Android Wear OS must be developed and implemented in the course of the project).

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