UNIVERSITÄT ZU LÜBECK
INSTITUT FÜR MEDIZINISCHE INFORMATIK
NACHWUCHSGRUPPE MOVEGROUP

Call for Master, Bachelor Thesis or Student Research Project

Feature extraction from depth image videos and/or EMG-IMU time series of patients with myoclonus dystonia for clinical analysis

Description Myoclonus dystonia is a rare disorder that occurs in about 2 people per 1 million. The *MOVEGroup* is technically accompanying a study in which healthy control subjects and patients with myoclonus dystonia are recorded before and after non-invasive cerebellar stimulation using two Kinect cameras, EMG- and IMU- sensors. Various exercises are performed, while the execution of those should differ between patients and healthy test subjects. Using Face Mesh, Keypoint Detection algorithms and other feature extraction methods on the depth video recordings and the time series, the aim is to identify significant differences between the two groups and to investigate whether cerebellar stimulation can change certain movements.
Here, you will delve deep into the field of computer vision and/or time series analysis, and we will support independent and creative initiative. The work can be the first building block on the way to an automated dystonia assessment. The methods used can possibly be extended to other clinical pictures from the group of movement disorders. Related publications (thematic and methodological) are listed below.**Beginn** Ab sofort oder nach Absprache.

Keywords Myoclonus dystonia, computer vision, keypoint detection, facemesh, Kinect cameras, IMU and EMG sensors, time series analysis, cerebellar stimulation

If you are interested and have any questions on this topic, **please book an appointment** via : https://calendly.com/fudickar/

Dr. Sebastian Fudickar

Junior Research Group "Integration and Analysis of Multimodal sensor signals and clinical data for the diagnosis and research of of neurological movement disorders" (MoveGroup)

Further topics for theses at: move.ulü.de

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[2] Pedrero-Sánchez, J. F., Belda-Lois, J. M., Serra-Añó, P., Mollà-Casanova, S., & López-Pascual, J. (2023). Classification of Parkinson's disease stages with a two-stage deep neural network. In Frontiers in Aging Neuroscience (Vol. 15). Frontiers Media SA. https://doi.org/10.3389/fnagi.2023.1152917

[3] Oung, Q. W., Hariharan, M., Lee, H. L., Basah, S. N., Sarillee, M., & Lee, C. H. (2015). Wearable multimodal sensors for evaluation of patients with Parkinson disease. In 2015 IEEE International Conference on Control System, Computing and Engineering (ICCSCE). 2015 IEEE International Conference on Control System, Computing and Engineering (ICCSCE). IEEE. https://doi.org/10.1109/iccsce.2015.7482196

[4] von Möller, K., Herzog, R., Bolte, C., Münchau, A., Bäumer, T., & Weissbach, A. (2023). The impact of cerebellar transcranial alternating current stimulation (tACS) and simultaneous motor network activation via motor sequence learning (MSL) on movements and muscle strength. In Proceedings of the 8th international Workshop on Sensor-Based Activity Recognition and Artificial Intelligence. iWOAR https://doi.org/10.1145/3615834.3615857

[5] Herzog, R., Berger, T. M., Pauly, M. G., Xue, H., Rueckert, E., Münchau, A., Bäumer, T., & Weissbach, A. (2022). Cerebellar transcranial current stimulation – An intraindividual comparison of different techniques. In Frontiers in Neuroscience (Vol. 16). Frontiers Media SA. https://doi.org/10.3389/fnins.2022.987472