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Vortragsankündigung

Seminar Regelungssysteme LV 0430L654

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Prof. Jianhua Zhang
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"Mental Workload Level Recognition by Combining Wavelet Packet Transform and Kernel Spectral Regression LDA Techniques"

Accurate recognition of the time-variable fluctuations (or variations) of operator mental workload (MWL) under human-machine (HM) interactions is crucial for preventing the accidents caused by operator cognitive overload and inattention in safety-critical HM systems. In this talk, we developed a Mental Workload (MWL) recognition system based on psychophysiological data to assess temporal variations in MWL levels (or classes) in an objective and noninvasive fashion. Salient EEG features were first extracted by using fuzzy mutual-information- based wavelet-packet transform (FMI-WPT). Then we adopted the kernel spectral regression linear discriminant analysis (KSR-DA) to reduce the EEG feature dimensionality and to simultaneously enhance the inter-class discrimination capacity of the MWL classifiers. By combining FMIWPT and KSRDA techniques, we designed, evaluated and compared different types of MWL classifiers. The results demonstrated a significant improvement of the MWL classification accuracy by the proposed feature reduction method and classifier design framework. In particular, it was shown by extensive comparative studies that the k-Nearest Neighbor (KNN) and Support Vector Machine (SVM) outperform other classifiers.