

Photoplethysmography Imaging – Future Prospects and Challenges

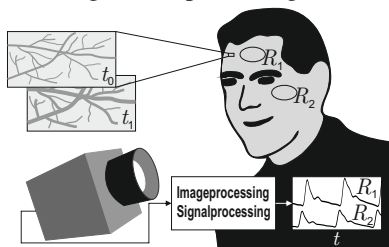
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Photoplethysmography Imaging (PPGI) is a rather novel technique to unobtrusively acquire photoplethysmographic information with a camera. PPGI allows contactless and spatial assessment of peripheral perfusion. Due to its unobtrusive spatiotemporal nature, PPGI offers great potential and new possibilities for diagnostics and monitoring. However, despite a wide range of possibilities, PPGI has barely realized its potential in practical use to date. The technology holds many pitfalls as it relies on complex processing pipelines including not only signal processing but also image/video processing.

The Special Session “Photoplethysmography Imaging – Future Prospects and Challenges” sets an impulse in which experienced PPGI researchers aim to provide a sound knowledge base and stimulate innovative thoughts to foster novel research ideas and application transfer. The introductory talk of the Special Session presents key concepts for the design of PPGI measurements with a focus on data acquisition and data processing. In addition, the introductory talk highlights potential applications, points at open fields of research, and discusses how to avoid common pitfalls.



Recent works have demonstrated clinical applications such as the monitoring of recovery after cardiac surgery, the detection of tumor tissue during surgery, the monitoring of neonates, and the measurement of perfusion during skin flap transplantation, for example. Measurement of heart rate, breathing rate, heart rate variability, oxygen saturation, perfusion strength, and blood pressure correlates, among others, have been reported with varying levels of accuracy. In contrast to conventional contact-based photoplethysmography, the spatiotemporal resolution of monochromatic or color cameras allows PPGI to access additional information. While the design principles of PPGI measurements are complex, the application of PPGI is as simple as recording a video. This renders PPGI ideal, e.g. for multi-parameter monitoring in telemedicine, in scenarios where the spatial resolution provides additional information, or when vulnerable subjects should be spared from contact-based measurements.

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