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Development of Non-invasive Alcohol Analyzer by Using Photoplethysmography

Photoplethysmography (PPG) is one of the optical signals commonly used in clinical research for measuring virtual signs. In some previous studies, PPG was often used as an indicator for detecting blood volume changes in the micro-vascular. The advantages of PPG signal the mentioned in studies are; non-invasive, lower operation cost, and the simplicity of the procedure. Although some the components of the PPG signal are not fully understood, it is generally accepted that it can provide valuable information in clinical study. It is interesting for finding a relation between PPG signal and blood alcohol concentration.
The objective study is to classify two groups of ten-volunteer subjects (age between 25-30): (1) group of people who consumed alcohol and (2) non-consumed alcohol, by using the differential of PPG signals in these two groups and compared the results with fuel-cell breath alcohol analyzer. A set of PPG reflection data is recorded from optical sensors including the wavelength light of the red channel and the infrared channel from the fingertip of individuals. In additional, we examined the changes of each signals to distinguish two classes of interest. The set of data is computed and analyzed to find the correlation coefficient between significant variables in statistic domain, the techniques are including (1) slope of the signals over time, (2) peak to peak of the heart rate, and (3) deep of waveform valley after rotation. In conclusion, the result of the study provides a preliminary result of discrimination between consumed and non-consumed classes. It is suggested to use PPG as an initial screening and it is suitable for a portable-measurable device. However, the result yet cannot be claimed in the evidential test.

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