

Autonomic Nervous System Data: Automatic Analysis

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Electrodermal activity (EDA) and heart rate (HR) are important measures in analyzing the autonomic nervous system (ANS). Commercially available technology allows for the external measurement of ANS data; however, several limitations exist. Despite the numerous parts of the body that transmit sufficient signals, current research primarily uses the fingertips for collection of data, which poses limitations for many pathologies involving the extremities. Additionally, the analysis of this data typically requires expensive software and/or experience with programming. Thus, our solution is a user-friendly automated analysis program for ANS data, customizable to data collected at varying locations on the body including the forehead, shoulders, and fingertips. To begin, we collected EDA data on the forehead, shoulders, and fingertips as well as HR data on the earlobe and fingertips from 10 different participants at the Stepp lab at BU. Using the data collected, we selected appropriate filters for each electrode location and added it to our software. We also expanded on the measures already being analyzed at the Stepp lab and added a Graphical User Interface (GUI) to make it more user friendly. To use our software, the user will input 4 data sets, electrode location, participant ID, and sampling frequency and click “Run”. The data will then be analyzed and output 9 EDA measures, 3 HR measures, and 2 graphs as a .mat file. This analysis application will aid in future clinical research, as well as any study where measurement of the ANS is not ideal, or possible, from the fingertips.

