Hand Gesture Interpretation Using Sensing Glove Integrated with Machine Learning Algorithms

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Abstract : In this paper, we present a low cost design for a smart glove that can perform sign language recognition to assist the speech impaired people. Specifically, we have designed and developed an Assistive Hand Gesture Interpreter that recognizes hand movements relevant to the American Sign Language (ASL) and translates them into text for display on a Thin-Film-Transistor Liquid Crystal Display (TFT LCD) screen as well as synthetic speech. Linear Bayes Classifiers and Multilayer Neural Networks have been used to classify 11 feature vectors obtained from the sensors on the glove into one of the 27 ASL alphabets and a predefined gesture for space. Three types of features are used; bending using six bend sensors, orientation in three dimensions using accelerometers and contacts at vital points using contact sensors. To gauge the performance of the presented design, the training database was prepared using five volunteers. The accuracy of the current version on the prepared dataset was found to be up to 99.3% for target user. The solution combines electronics, e-textile technology, sensor technology, embedded system and machine learning techniques to build a low cost wearable glove that is scrupulous, elegant and portable.