

Wearable Electronics: The Next Growth Engine for the US Economy

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The American economy is at a crossroads. In order to sustain its growth, new areas of innovation must be exploited. One area of great promise is the area of wearable electronics. Potential application areas are widespread and encompass a number of industries to include gaming, defense, health, and education. Success in developing wearable electronics, or simply wearables, hinges on the ability to create devices that are accurate, intuitive, and innocuous. In the sense that humans have a tendency to gesticulate when communicating with other humans, wearables allow humans to communicate with electronics through gestures. This talk begins with a brief history of the microprocessor, the brains behind the wearable revolution. Next the history of wearable technologies is examined and extended to my current research. In this research a wearable controller, worn on the right forearm, has been developed which is capable of recognizing specific gestures performed by the right hand. The controller uses the thin film piezoelectric polymer polyvinylidene fluoride (PVDF) as the sensing mechanism to detect muscle contractions in the forearm; the PVDF electrodes have been spatially shaded for increased sensitivity. The sensor's output is passed through a time delay artificial neural network which discerns whether or not the input signal was generated by a target gesture. The network was trained to recognize two sets of gestures which it was able to do with varying degrees of success. Various software applications were developed which interact with the controller to demonstrate its capabilities including an Android oscilloscope and gesture recognition "app" and a PowerPoint presentation navigator "add-in". The use of stretchable piezoresistive sensors is proposed as a next step moving forward to overcome the inability of the PVDF to sense static positions.