Monitoring Your Brainwaves at Home with EEG

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Electroencephalogram (EEG) machines are often used to diagnose and monitor seizures, brain abnormalities, and sleep disorders, as well as for biofeedback. Versatile personal EEG machines often cost $1000 or more. Less expensive EEG machines are limited to a set electrode position and have limited user interface that simplifies the data. For this project an electroencephalogram machine was designed for under $100 and initial test are promising for the accuracy and versatility. An EEG machine has three basic stages, an amplification stage, a frequency filtering stage, and the output. A schematic for the circuit, which used an instrumentation amplifier and two operational amplifiers, was designed, tested and revised. A program for an Arduino was written to transmit the data over the USB to the computer, sending a header code before each data point. A java program was written that reads the data and graphs it. The java program also has a software amplification feature, which makes the graphs easier to read. Qualitative data was used to determine if the EEG was reading and recording data that was consistent with research. The patterns of the brain waves were tested 10 times each for three different electrode placements. The data obtained from these test were compared to each and found to be consistent from test to test. The data also correlated with what one would expect to see based on research of EEG readings for the three placements tested. Further testing with quantitative data would be a beneficial next step for this device.

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