K. Thirupathi, A microcontroller based audiometer, M. Tech. Thesis, Department of Biosciences and Bioengineering, Indian Institute of Technology Bombay, June 2011.

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Abstract: An audiometer is an electro-acoustic instrument for quantifying hearing impairment and for diagnosing its causes. The project objective is to develop a compact portable instrument that can be used as a screening audiometer and can also be used for clinical and research applications. A microcontroller based audiometer "IITB-2K11" is developed for conducting tone audiometry, short increment sensitivity index test, tone decay test, and speech audiometry, individually on the two ears by presenting a sequence of acoustic stimuli and receiving the patient's responses. An 8-bit microcontroller is used for all the interfacing and control operations. A combination of 16-bit DSP chip with on-chip ADC and DAC and an SD card is used for generating stimuli and masking noise. Pure tone, warble tone, and pulsed tones over a frequency range from 125 Hz to 8000 Hz, and speech are available as the test stimuli. Wide-band noise, narrow-band noise, and speech-spectrum shaped noise can be used as the masker. A chip with two programmable log attenuators is used for controlling the presentation levels of the stimulus and the masker. A 4x4 keypad and a 128x64 pixel graphics display are used for user interface. The tests can be administered in manual or automated modes. For a given set of transducers, the instrument can be calibrated through its user interface with the calibration data saved in the internal nonvolatile memory. The test results can be transferred using RS232 for preparation of test report.