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ezAFM: A low cost Atomic Force Microscope(AFM) UMIT CELIK, KUBRA CELIK, Department of Material Science and Engineering, Istanbul Technical University, HUSNU ASLAN, IHSAN KEHRIBAR, Faculty of Engineering & Natural Sciences, Sabanci University, MUNIR DEDE, NanoMagnetics Instruments Ltd., H. OZGUR OZER, Department of Physics Engineering, Istanbul Technical University, AHMET ORAL, Faculty of Engineering & Natural Sciences, Sabanci University — A low cost AFM, ezAFM is developed for educational purposes as well as research. Optical beam deflection method is used to measure the deflection of cantilever. ezAFM scanner is built using voice coil motors (VCM) with $\sim$50x50x6 μm scan area. The microscope uses alignment free cantilevers, which minimizes setup times. FPGA based AFM feedback Control electronics is developed. FPGA technology allows us to drive all peripherals in parallel. ezAFM Controller is connected to PC by USB 2.0 interface as well as Wi-Fi. We have achieved <5nm lateral and $\sim$0.01nm vertical resolution. ezAFM can image single atomic steps in HOPG and mica. An optical microscope with <3 μm resolution is also integrated into the system. ezAFM supports different AFM operation modes such as dynamic mode, contact mode, lateral force microscopy. Advanced modes like magnetic force microscopy and electric force microscopy will be implemented later on. The new ezAFM system provides, short learning times for student labs, quick setup and easy to transport for portable applications with the best price/performance ratio. The cost of the system starts from $15,000, with system performance comparable with the traditional AFM systems.

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