Ultrasonic Levitation

Reed, Connor

The goal of this project was to create a standing acoustic wave at a high frequency in order to suspend small, lightweight object, such as Styrofoam, in midair. To do this the student was given electronic components and a circuit board schematic. The student then built a circuit board that, when built correctly, powered an ultrasonic transducer. The results were that the circuit board worked as intended and powered the ultrasonic transducer. The student then lowered the reflector until a piece of Styrofoam placed on the powered transducer lifted into the air. The measured distance between the ultrasonic transducer and the reflector is 12 cm. The student was able to reason that the device worked due to the raise in air pressure that occurs at the anti nodes of a standing wave, which raises the density of the air to a point where the air is denser than the Styrofoam. The overall project was a success but, the way in which the circuit board was built caused the heat sink and the transformer to heat up very quickly, limiting the run time of the machine to about 5 minutes before needing to cool down. The use of a 555 timer inhibited the circuit's ability to put out a sine wave in the voltage since 555 timers produce square waves.

Awards Won: