

Self-Amplified Acoustic-Electric Guitar

In an electric guitar, electric/magnetic pickups capture the vibrational patterns of the vibrating metallic strings and convert them into a voltage signal, which is amplified and then passed to a speaker. The speaker includes one or more transducers each connected to a sound cone. Each transducer vibrates according to the output of the amplifier, thereby causing the sound cone to vibrate and create the sound that we hear.

In an acoustic guitar, the amplification of the (very quiet) vibrations of the guitar strings is achieved by the hollow body of the guitar. The sound waves emitted by the vibrating strings cause the guitar body to vibrate, resulting in the sound that we hear from the acoustic guitar. The tone quality and volume are thereby largely determined by the shape and material of the guitar body, which is performing a similar function to the amplifier and speaker of an electric guitar. Acoustic guitars can also be outfitted with electric/magnetic pickups so that their sound may be amplified and output to an external speaker.

A first goal of this project is to design a transducer device that attaches to the body of an acoustic-electric guitar uses the guitar's body as a "speaker". More specifically, the guitar's output cable, which would normally be plugged into an amplifier/speaker, will instead be plugged into this transducer device, and the device will turn the body of the guitar into a speaker.

A second goal of this project is to use DSP to modulate the guitar's output in order to add effects such as distortion, reverb, delay, and any other effects of interest.

