

DIY iPod accessories

iPod
Social
Outreach
Program

Ultrasonic iPod Microphone

Works with: 3rd & 4th Generation and the original color iPods

Does not work with: 1st, 2nd & 5th Generation, nano, mini or shuffle iPods

Introduction

This simple microphone will enable you to make ultrasonic recordings. In order to use the mic you will need to install Linux on your iPod. *iPodLinux* turns the iPod into a dual booting machine, allowing you to run either the iPod's original operating system or the Linux OS. *iPodLinux* also enables the iPod's built-in recording hardware, permitting you to record at sample rates up to 96 kHz. This gives the iPod a theoretical frequency response of about 48 kHz (i.e. half the sample rate). By comparison the average human has difficulty hearing sounds above 18 kHz. Many bats use ultrasonic echolocation in the 30-50 kHz range so this mic could potentially be used to record bat calls. The mic is not however going to provide you with an audiophile experience, it's not particularly sensitive or well suited to detailed sound recordings but it is easy to construct and makes for an interesting iPod accessory. Note: all recordings will be in mono.

Parts

3.5 mm audio connector

- this is a standard headphone jack, they are available from any good (or mediocre) electronics store

one (or more) piezo buzzer/s

- you can find this component in cheap alarms or buy it new from an electronics store. I used a 12V, 15mA Mini Piezo Buzzer for \$3.25

Construction

To construct the mic connect the buzzer's positive (red) lead to the audio plugs centre pin; connect the buzzer's ground (black) lead to the audio plugs ground pin (the big outer connector); the third contact on the audio plug should be left unconnected. Insulate the connections and seal up the audio plug.

Before using the mic you will need to install *iPodLinux* onto your iPod; this is a very simple procedure, it shouldn't affect your iPod's original operation, and it's free! The *iPodLinux* project consists of two main components, the Linux (*uClinux*) kernel and a user interface called *podzilla*. These components are currently packaged in an easy to use installation program. If you're using a Mac you can get the *iPodLinux* installer here: ipodlinuxinst1.sourceforge.net, if you're running Windows or Linux you should go to this page: www.ipodlinux.org/Installer_2

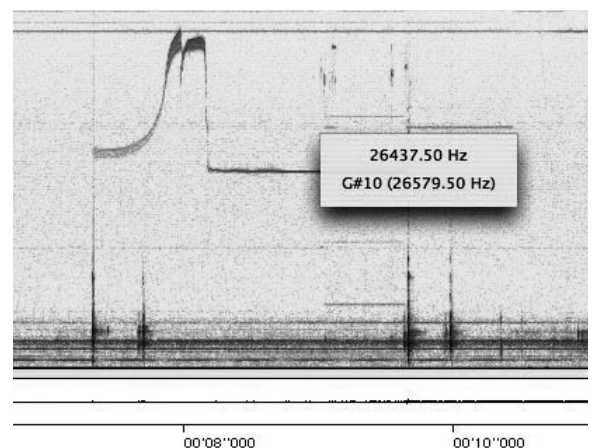
Once installed you can boot into Linux by holding down the 'rewind' key while the iPod is starting up.

Optional: If you want to increase the mic's response you can connect two or more piezo buzzers together in series. Do this by connecting the black lead from one buzzer to the red lead from the next buzzer; continue connecting until you run out of buzzers. You then connect the two remaining leads (one red and one black) to the audio plug as described above.

Use

Plug the mic into the iPod's headphone socket and boot into *iPodLinux*. Go to the 'Recording' menu, set the 'Sample Rate' to 96 kHz, and record something. If you're looking for ultrasonic noise around the home then fluorescent lights are a safe bet.

An interesting feature of this mod is that the mic will also act as a speaker (this is the buzzer's intended function). You may have to hold the buzzer to your ear in order to hear anything; it will be quite soft. Of course, unless you perform some sort of pitch shift on the recording you're not going to hear any of the ultrasonic noise. Currently there is not *iPodLinux* application that will do a pitch shift, but if you transfer the file to your computer there are a whole bunch of options. The image on the right is a sonogram of my florescent lamp. You can see the ultrasonic spike when I turn the light on and the operating frequency (about 26 kHz).



Warning!

Scott Mitchell, hereafter referred to as 'the author', is an amateur practitioner in the field being presented with no formal training or professional experience in electrical engineering, iPod service and repair, or any associated disciplines.

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