(Approx. 1239 words)

**Personal Audio Support in Live Meetings**
**Your portable device and earbuds (or headphones) can help you hear**

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**INTRODUCTION**

During a group effort to upgrade the audio-visual tech in the once-and-future classroom meeting space for PATACS in Fairfax City, VA, in June 2021, the president of PATACS casually mentioned that some audience members might need extra help hearing instructors and other speakers at meetings.

The room has six public-address loudspeakers installed, all conveying the microphone of the instructor. The audio volume on those speakers is necessarily limited to avoid audio feedback through microphones used by instructors.

I decided to look into it. I chose to focus on the astute use of audience smartphones and tablets. Bring alone headphones or earbuds, run an app to receive meeting audio, and adjust the volume to suit personal needs.

Since all PATACS meetings are made available to members via Zoom, initially, I thought of using Zoom apps on portable devices while attending live meetings. As a result, I have had the Zoom app installed on my phone and tablet for more than a year.

**AUDIO DELAY TIMING TESTS**

However, there is an issue worth considering: Zoom audio is delayed a bit. When attending a meeting remotely, that delay is no big deal. However, I wondered if it would be annoying in a meeting while watching an instructor.

I did some timing tests to quantify the Zoom audio delay, using three different approaches: phone running Zoom and connected via Wi-Fi, a phone running Zoom and connected via the cell phone network, and a phone not running Zoom but dialed into the Zoom phone number for audio. Finally, I hosted a meeting on my desktop PC and connected to that meeting using my smartphone and each of the three methods.

The least delay was **0.38 seconds**. I think that is excessive. So, I set out to find other options.

I tried using the free **VLC application** on a computer to live-stream audio on Wi-Fi. Next, I used the free VLC app on my Samsung Galaxy S10 phone to receive the streaming audio. I quantified that delay too: **0.781 seconds**, using HTTP protocol and MP3 transcoding. FLAC transcoding also worked but progressively increased delay, starting at 0.8 seconds and growing to 1.02 seconds after 60 seconds of audio. Neither offers a smaller delay than Zoom.

Then I thought about this: why not have the portable device pick up meeting audio using its microphone?

There are apps for that.

**SOUND AMPLIFICATION APPS**

The apps for smartphones and tablets were created for several different needs. Some are specifically intended to be used by a classroom teacher, using the teacher's smartphone to amplify the teacher's voice in a traditional classroom environment. Some apps offer audio recording capabilities for meetings. But all do the work required: pick up meeting audio via the smartphone microphone, and provide that audio through headphones or earbuds, enabling the user to adjust the personal audio volume to suit their own needs.

I tried two apps. The good news is the audio delay using these apps is about ten times less than the most minimal Zoom audio delay.

**AN APP FOR ANDROID PORTABLES**

The app I tested for Android devices is **Safe Headphones**, published by jApp. You can see its icon in **illustration 1**.

The main screen of the app, shown in **illustration 2**, is very sparse and contains a small on/off switch. The switch is circled in the illustration. Tap that switch to turn on the audio feed from the device microphone.

***Illustration 11***

The text on the screen points out that this particular app is designed to let you listen to music on earbuds or headphones while also listening to the ambient sounds around you. However, the app also works well as a room sound amplifier when no other apps produce sounds.

***Illustration 2***

Since I had developed a system for testing audio delay, I used it for this app: on my Samsung Galaxy S10 phone, the delay was 0.014 seconds. Much better! As of mid-2021, my S10 is not the current top of the line from Samsung; later models with faster chipsets may further reduce the delay.

***Illustration 21***

**AN APP FOR IOS PORTABLES**

The second, for Apple devices, is **Megaphone**, published by Netviking. You can see its icon in **illustration 3**.

The main screen of the app, shown in **illustration 4**, depicts a cardioid microphone with an on/off switch, which is circled in the illustration. Tap the switch to hear what the device's microphone hears.

Note there are many other apps in the store with the word megaphone in their names.

***Illustration 31***

I tested the Megaphone app one on my ancient, retired iPhone 5 using iOS 10.2.4. The delay experienced using this app was 0.042 seconds. Also, much better. I suspect that newer iPhones with faster chipsets may further reduce that delay.

**BATTERY CONSIDERATIONS**

***Illustration 41***

If the meeting you attend is very long, you may wish to carry along a power bank battery for charging your smartphone while using it to amplify meeting sound.

Another way to conserve battery power on your smartphone is to use a different device, such as a tablet or a retired smartphone, to run the app of your choice for personal audio support.

**OTHER METHODS**

There are at least two other methods of audio distribution for personal use that could be tried. However, both of these methods require some effort and expense by the meeting organizer.

**Low-power FM radio transmitters** are available online. These became very popular during the pandemic, especially for church services in church parking lots. The fundamental problem in a meeting room is on the audience side: portable FM receivers are no longer very popular. However, portable FM receivers are available for as little as $10 online. In addition, some MP3 players, such as the Sandisk Sansa Clip and iPod nano, have FM receivers built in.

FM receivers are great to have on hand when the phone network is down. I recall that the phone voice network was down in Washington DC for a couple of hours after the 2011 earthquake of 5.8 magnitude. While the phone voice network was down, the cell tower data service was overloaded, so I could not use my smartphone to check news sites. I would have been happy to have a portable FM receiver in hand for listening to the all-news radio station while forced to stand outside my office building for a couple of hours.

Another approach uses **induction coils** to transmit sound directly to the T-coil inductor contained in some hearing aids. The IEEE.org website provides an article describing a do-it-yourself approach, but the cost of even that approach is hundreds of dollars at a minimum, and not every hearing aid includes a T-coil. There is also a physical challenge: installing the transmission coil close to the audience but isolated from other electronic devices that might be affected by the transmission coil.

ABOUT THE AUTHOR: John Krout has been writing about creative uses of personal computers since the early 1980s and now covers portables including smartphones, tablets, and digital cameras. He is retired from a long career as a C/C++ software engineer and lives in Arlington, VA, with his son, many computers and digital cameras, and too many cats.