

Cacophonometer Setup Instructions

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1. Introduction

**** The current version (1.2) of the software can 'hang' for about 90 seconds when it starts up (it is testing if it can turn flight mode on/off). Please just give it time to do its thing. – working on a fix ****

The Cacophonometer consists of an Android App, Android phone and possibly an external microphone that together make regular audio recordings that can be uploaded to the Cacophony server for analysis.

How you setup your Cacophonometer will depend on your particular scenario including:

- Power supply - Mains power or solar panel?
- Internet connection (Wifi, Mobile/SIM, none)?
- Phone left in single location, or you are carrying it around with you (on a bush walk)?
- Normal or test setup?
- Using remote control software (AirDroid)?

2. Register on Cacophony Server

Before setting up the phone itself, you will first need to create an account on the Cacophony server.

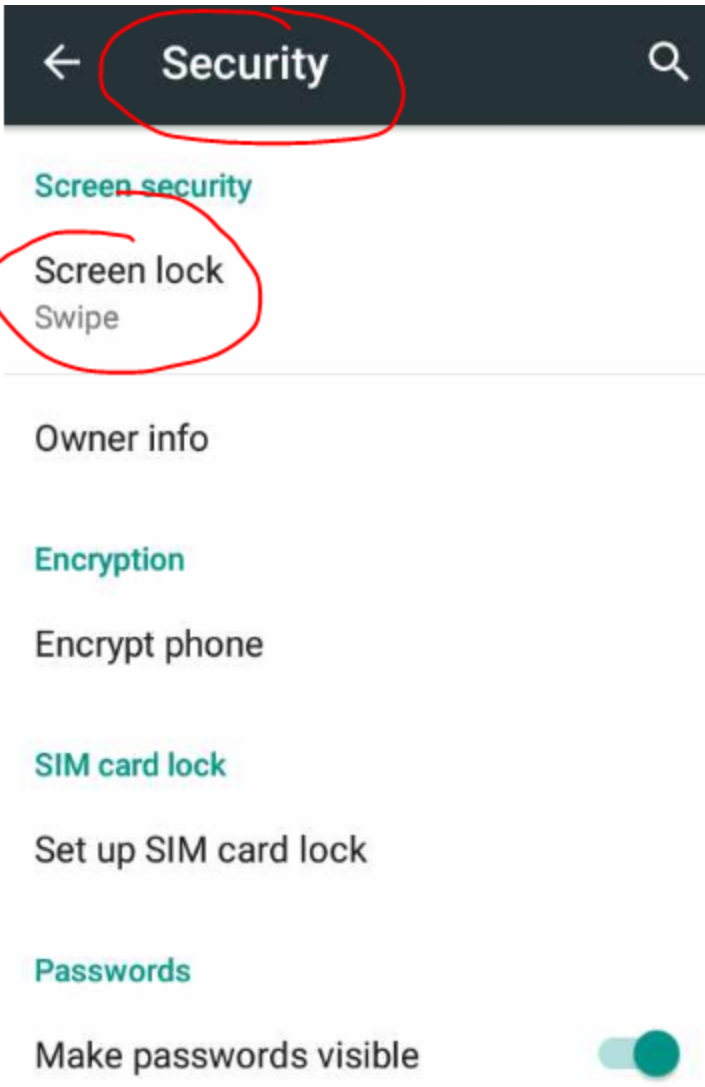
1. From your computer, go to <https://browse.cacophony.org.nz/>
2. Register and login with your chosen username.
3. Create a 'New Group' and remember this group for later as you will need to enter it into the App.

3. What phone to use?

The Cacophonometer App has been designed to work on all Android phones running a minimum of Android 4.0 Icecream sandwich, and has been extensively tested on the Spark Lite ZTE BLADE A110 running Android 5.1 which was used for these instructions (your phone settings may be slightly different).

I recommend that you setup a PIN on your phone so that if someone else has access to it, their ability to access the data on it will be reduced. To setup a PIN:

Open phones settings and select Security and then Screen lock

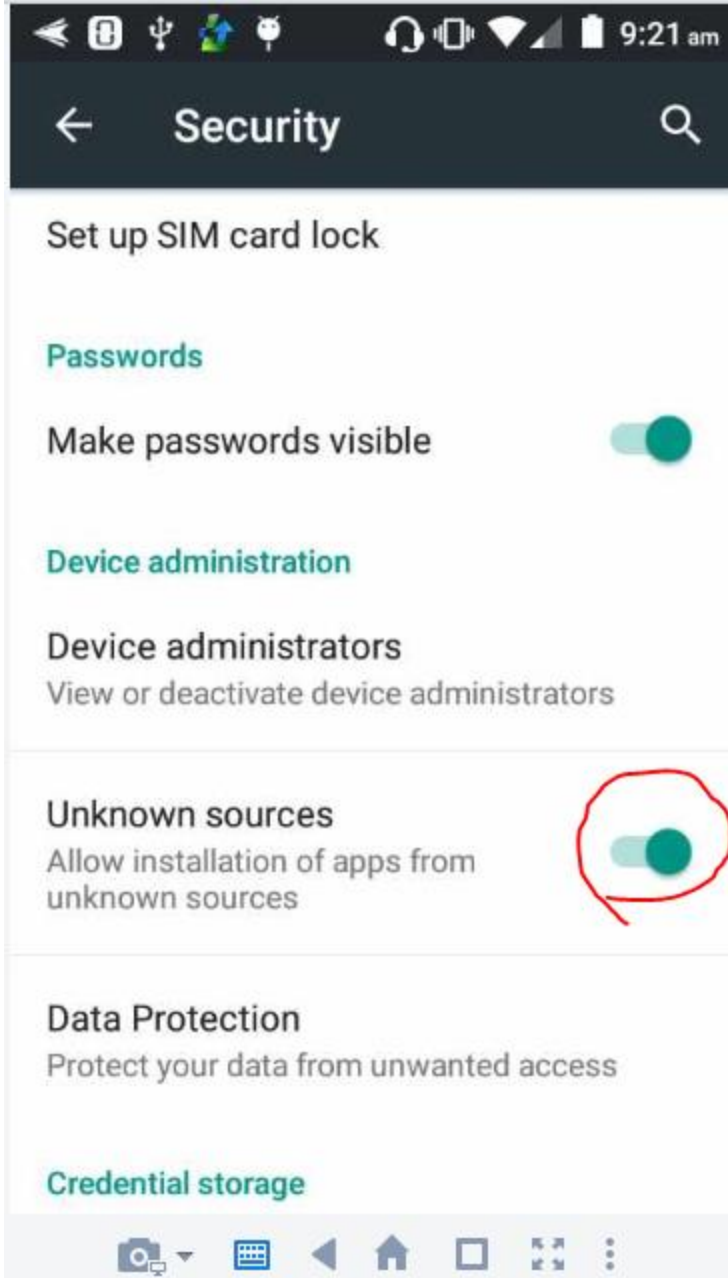


Click on Screen lock and choose PIN and enter a PIN that you can remember!

4. Install Cacophonometer App

Before you can install the app you will need to 'Enable unknown sources' which allows apps from locations other than Google Play Store to be installed.

- Open your phones 'Settings' and then 'Security' and enable 'Unknown sources' – see below.



- Download and install app

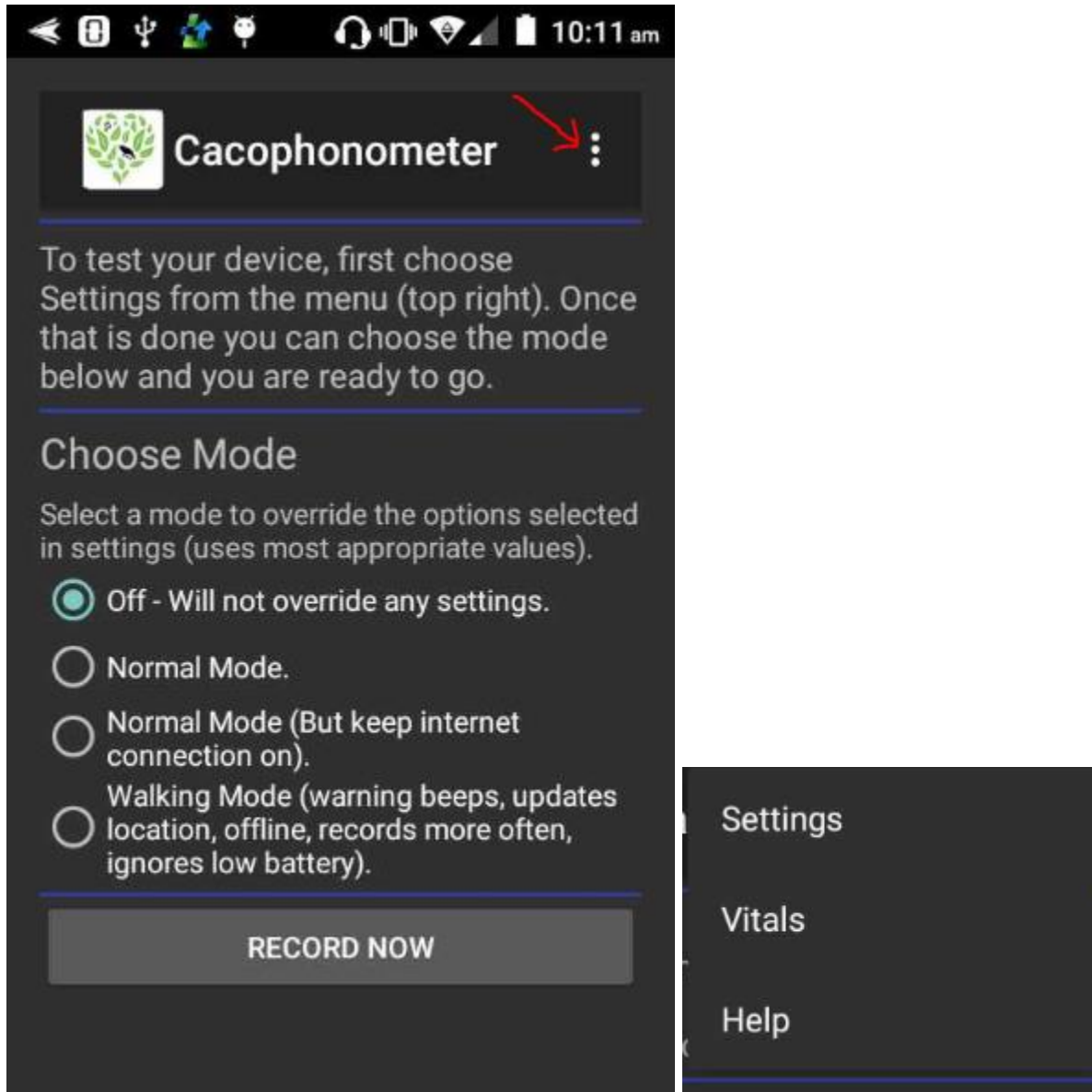
On the phone, use a web browser to navigate to <https://cacophony.org.nz/technology> and click on the link for the app (or follow the link through to GitHub to get the apk file). Once it has downloaded, open it and choose install. Follow the appropriate instructions below.

5. Basic Setup and Normal Mode

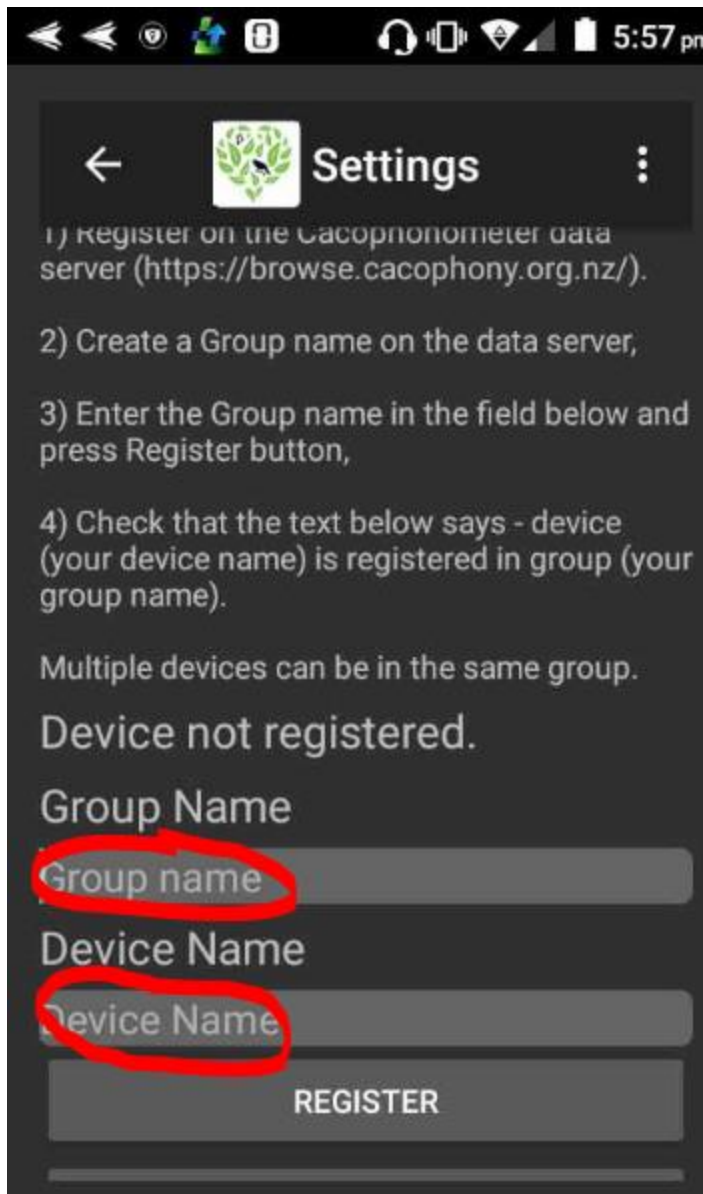
The basic setup assumes that the phone will be plugged into mains power and you have already setup an internet connection on the phone (either wifi or mobile data (SIM)). It may be that your phone is in airplane/flight mode which will prevent you getting an internet connection. If this is the case the easiest

way to disable flight mode is to press and hold the phones power button and wait for the Power Off menu to appear which will also have the option for disabling airplane mode. Further instructions at: <https://www.wikihow.tech/Put-an-Android-Phone-Into-Airplane-Mode>

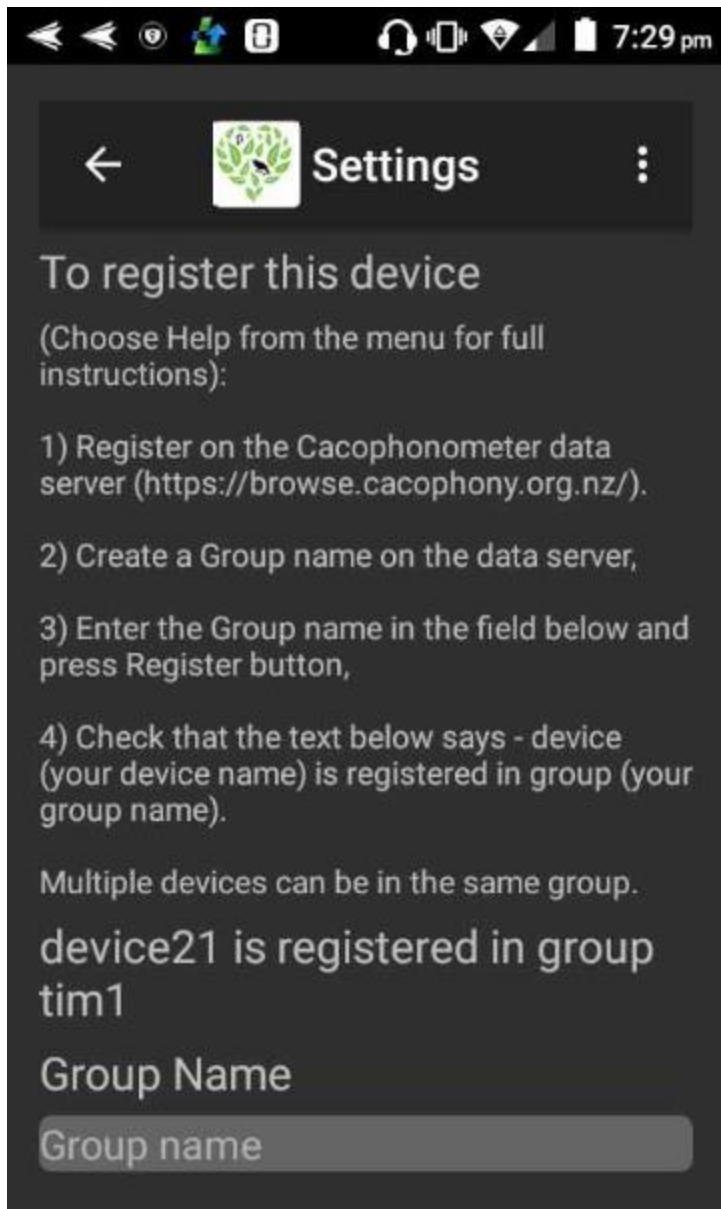
Now open the Cacophonometer app and you will see the screen shown below. Press the three dots (red arrow) and choose Settings from the pop-up menu.



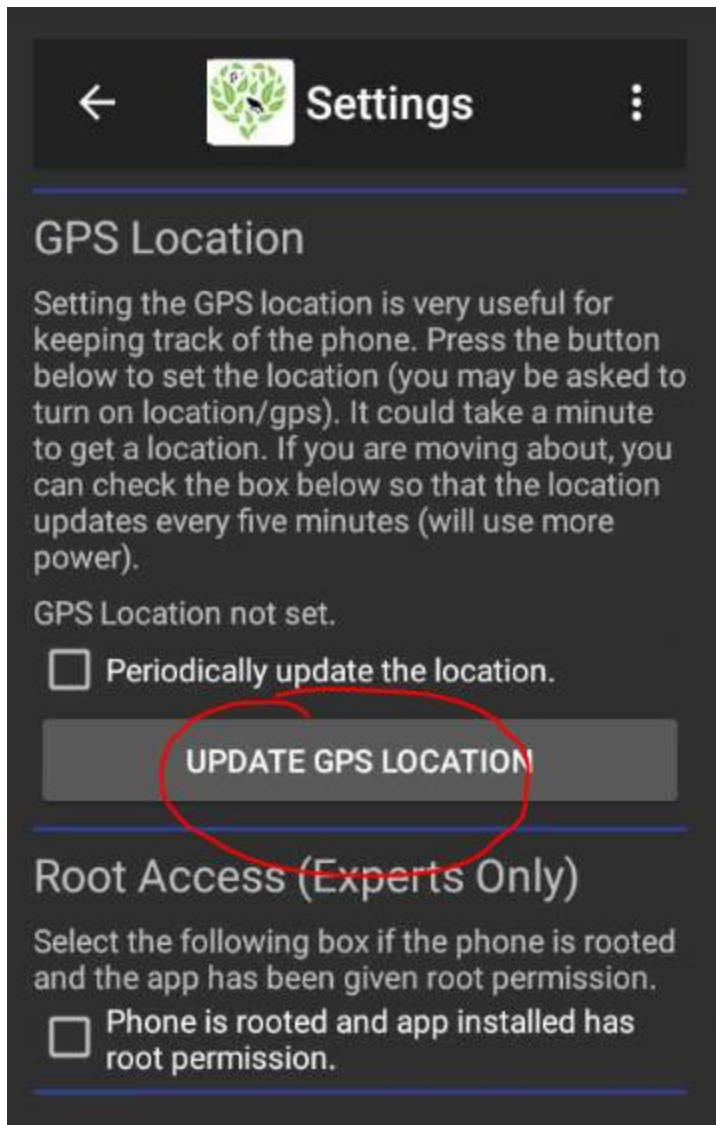
With the Settings screen shown below, enter the 'Group name' that you created when you registered on the server (Note: do NOT use your username here) and enter a device name (this can be any name that hasn't already been used e.g. tree1) press the REGISTER button.



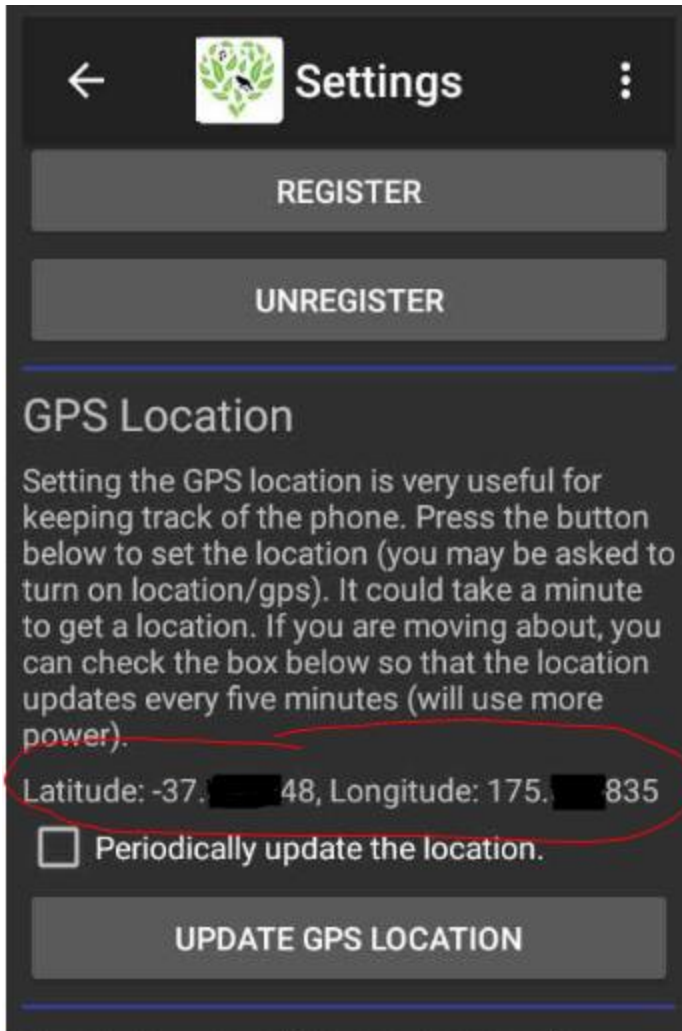
If you have an internet connection, you will see a green message saying that you have successfully registered, and the screen will be updated to show that the phone name is registered in a group (e.g. device21 in group tim1 in the screen below).



Now scroll down the page to the next section 'GPS Location' and press the 'UPDATE GPS LOCATION' button as shown below:

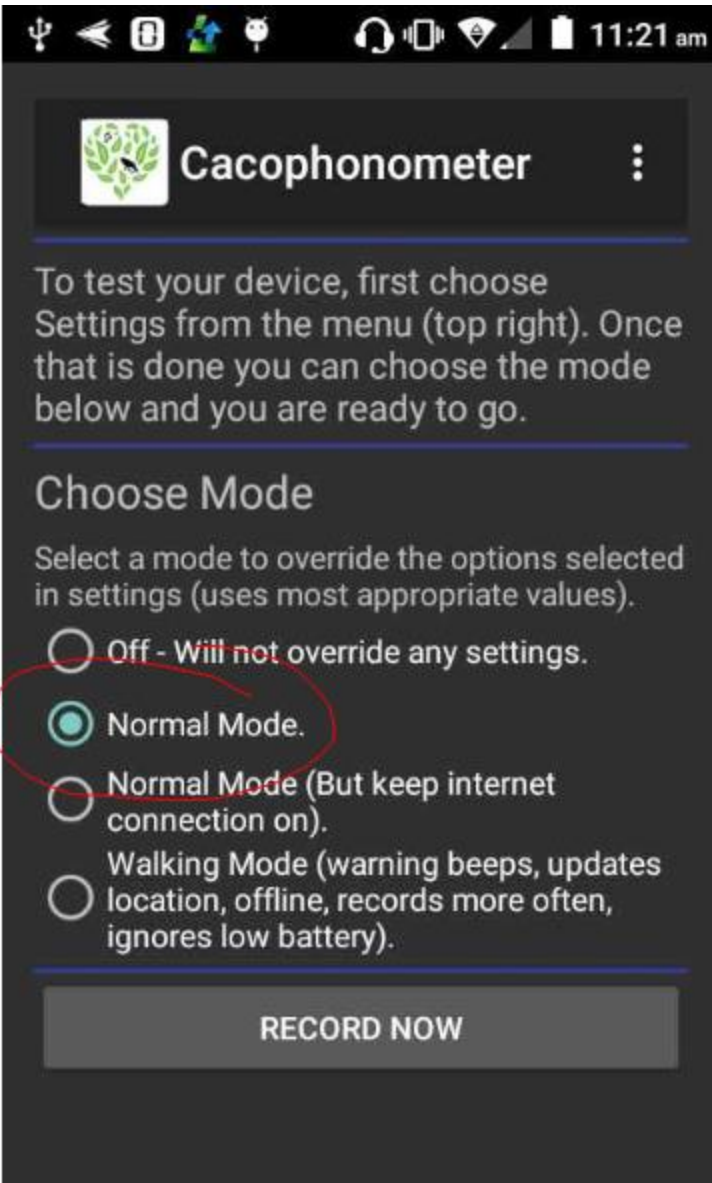


The phone will attempt to gain a GPS location. This may take a few minutes and you may also need to move to an outside location free from tall buildings for this to work. When the phone can get a GPS reading you will see a green message saying, 'New Location Saved' and the screen will be updated with the GPS location as shown below:



Do NOT select the 'Periodically update the location' box (that's for walking with the phone).

Return to the main screen by pressing the back arrow (at the top) and select the 'Normal Mode' button as shown below.

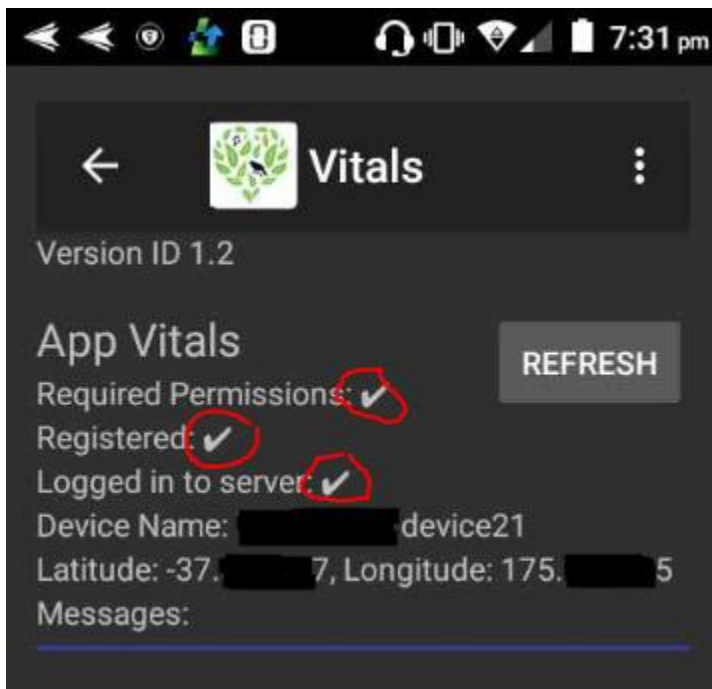
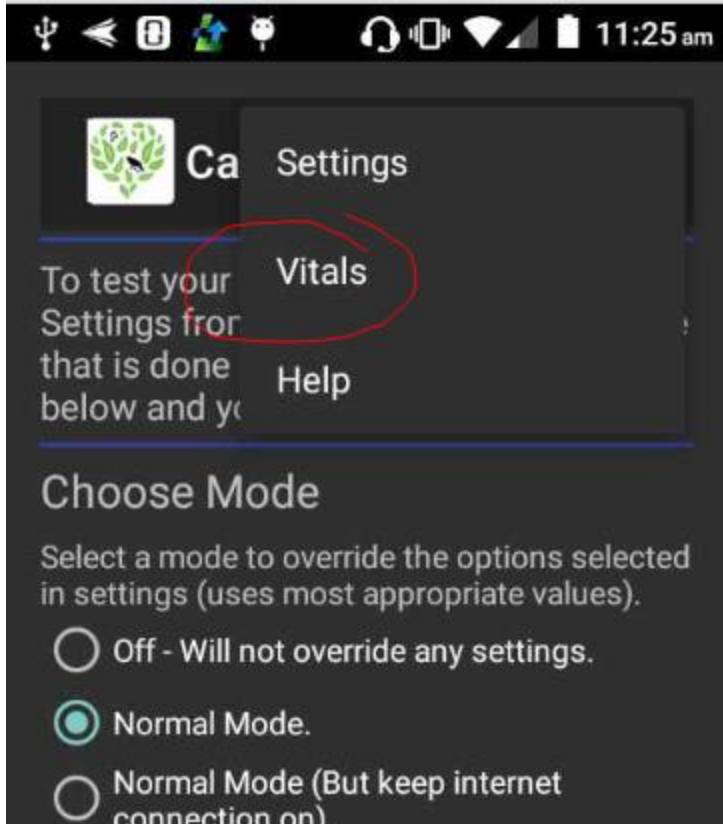


You have now finished setting up the phone and periodic recordings will have commenced (be careful what you say!).

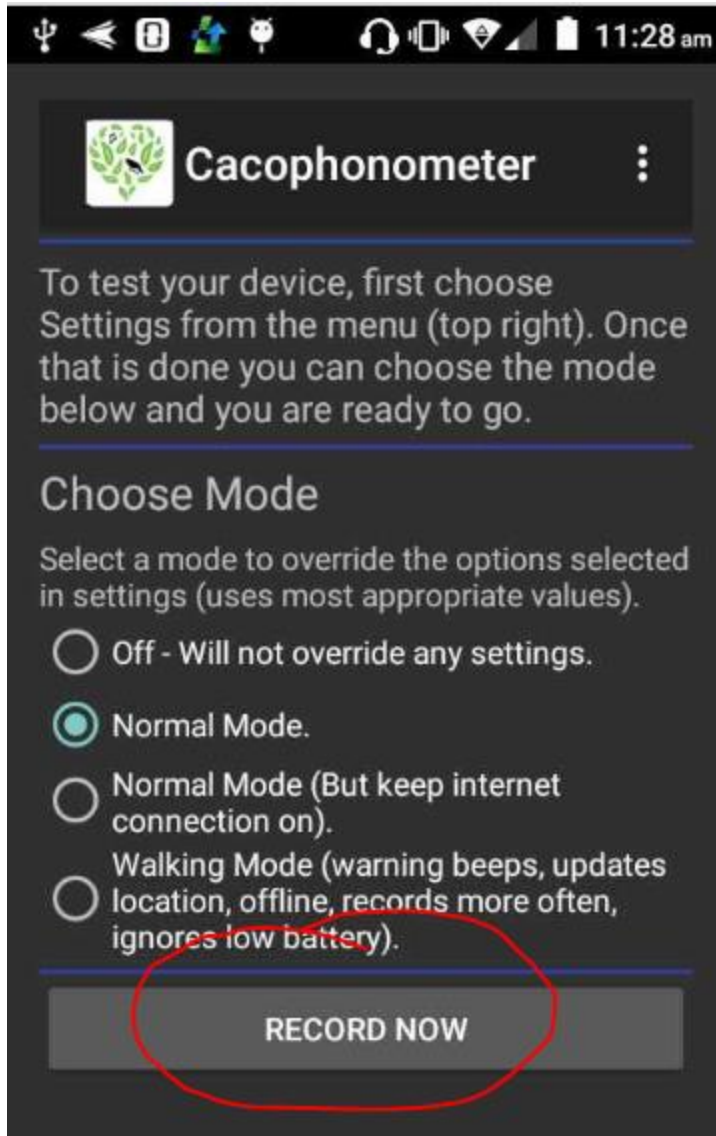
[Check all is working](#)

You will probably want to check all is working.

Press the three dots again and choose Vitals from the pop-up menu as shown below:



Confirm that you can see the 3 ticks and that there is a Device ID. Return to the main screen (shown below) and press the 'RECORD NOW' button to do a test recording.



After pressing the 'RECORD NOW' button, you will see the following green messages: 'Prepare to Start Recording', 'Recording Started', and the button will be 'greyed out' and disabled so you cannot press it again while recording is in progress. After 1 minute, the recording will finish, and you should see the following green messages: 'About to upload files', 'Files successfully uploaded', 'Recording and Uploading finished', and then the button will be re-enabled. If you see any red messages, then something has gone wrong.

Now check that your recording has been saved on the server. Return to the same website that you used for registering earlier and select the 'Recordings' tab. Press the blue Search button to display all the recordings that you have sent to the server. Confirm that you can see the recording that you made when you pressed the Record Now button.

The app will now automatically do the following:

- Every hour make a 60 second recording,

- For one hour either side of dawn and dusk, make a 62 second recording every 10 minutes.
- Every 6 hours, upload the recordings to the server. Note: The 6 hours is from when a file was last uploaded. Pressing the 'Record Now' button, ignores the 6 hour wait and uploads all files currently on the phone. You will have to wait another 6 hours, before the next automatic upload.

If you turn the phone off and back on again, the phone will automatically resume recording without you launching/opening the app. This is what I normally do – just means anything else running is shut down.

6. Deployment

Weather proofing

Depending on where you intend to locate your Cacophonometer, you may need to put it in a waterproof case such as shown below:



External microphone

We are still trialing microphones.

The image above also shows how an external microphone is being used. If you purchased a Cacophonometer from us we will have shipped the following microphone from:

<http://www.jlielectronics.com/microphones/jli-lav141/> We have removed the foam windscreen as we've been advised that birds can peck it off and choke on them 😞 This will mean an increase in wind noise on windy days but we may just have to miss out on recordings on those days.

You can also buy much cheaper versions from aliexpress. We have had variable success with the quality and the long term stability may not be as good. Take a look at: <https://www.aliexpress.com/item/Mini-3-5mm-Jack-Microphone-Lavalier-Tie-Clip-Microphones-Microfono-Mic-For-Speaking-Speech-Lectures-1/32839322866.html?spm=a2g0s.9042311.0.0.13c74c4dNYhQcB>

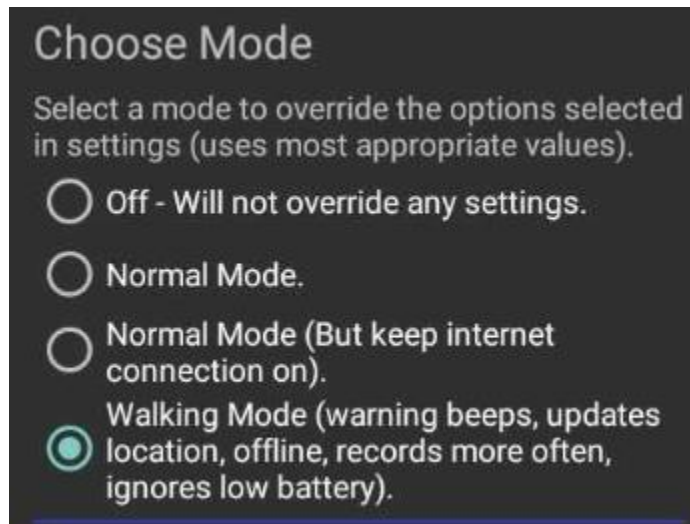
Both of these microphones are designed for indoor use and so try to keep it out of the rain! Long term stability has yet to be determined, but it is likely that it will need to be replaced every year? The higher quality microphone has an extra membrane to help prevent issues with moisture.

Final checks

When you are at the location that the phone is to be deployed:

- Update the GPS location.
- Do another test record.
- Check volume is set to silent.
- Check you have a PIN set on the phone.

7. Walking Mode



If you wish to use the Cacophonometer while out on a bush walk – choose Walking Mode. This will do the following:

- Make a recording every 15 minutes.
- Make a 'warning' beep before each recording starts (unless you are using an external microphone).
- Update the GPS location every 5 minutes.
- NOT upload any recordings to the server.
- Keep recording even when the battery is low.

Once you have finished your walk and are back in internet access range, just switch back to Normal Mode and the recordings will be uploaded to the server over the next day.

8. Other Modes

Off

Unlike the other modes, the 'Off' mode does not override any of the options selected in the settings screen. This allows for a much greater combination of options compared to the 3 preset Modes.

Normal Mode (But keep internet connection on)

In normal mode, the app will attempt to save power by turning on airplane/flight mode when not sending recordings to the server. This mode (keep internet connect on) will prevent this from happening – useful if you also want to remotely access your phone (See remote access section below).

9. Other Settings

Root Access

If the phone is being powered by a solar panel (rather than mains power) it is probably necessary to allow the app to enable airplane/flight mode in between sending files to the server – as this saves lots of power. However, the Android Operating System (OS) prevents the app from doing this automatically unless the phone has been rooted. If you have rooted the phone (see the section on rooting below) select this option so the app knows that it can enable airplane/flight mode.

Offline Mode

This mode acknowledges that you are not going to upload recordings to the server and so will never try to connect to the internet. A possible scenario is that you place the phone in a location where there is no internet access and so you will have to visit the phone on a regular basis to retrieve the recordings. If you use a SD (memory) card in the phone, the app will automatically use the card and you can just swap the card with an empty card each time you visit. You can then use your computer to copy the recordings off the card (with the aid of an adapter) or put the card into another phone that does have an internet connection and allow it to upload the recordings to the server. The app makes 48 recordings of 713KB each day (34 MB per day, 240MB per week) meaning a 32 GB memory card can store 133 weeks of recordings.

Online Mode

This mode is likely to be used if you have the phone on mains power and are also using remote access software to access the phone. See the Remote Access section later in these instructions.

Warning Sound

Useful for when you have the phone near you and you don't want to record yourself. Walking mode will also play a warning sound. Note that in most phones the speaker will not play a sound if an external microphone is also plugged into the phone.

It is probably worth noting that playing a warning sound could also affect the behaviour of any birds that you are trying to record.

Ignore Low Battery

The app will normally stop recording if the phone battery is getting low – this is to prevent the worse case scenario of the phone completely dying which would require a visit to the phone to turn it back on (just charging the battery will not cause the phone to turn back on).

You may want to ignore a low battery if it is easy to visit the phone, or if you are out walking.

Frequent Recordings

You can increase the frequency of recordings to once every 15 mins.

Settings for Testing

Use short recordings

Reduces the recording length from 60 seconds to 1 second

Use the Test Server

The test server can be used when you are testing!

Use very frequent recordings

Makes a recording every 2 minutes.

Use frequent uploads

Uploads the recordings immediately after any recording.

10. Rooting the phone

Introduction

([https://en.wikipedia.org/wiki/Rooting_\(Android\)](https://en.wikipedia.org/wiki/Rooting_(Android)))

Rooting the phone gives the Cacophonometer App the ability to automatically enable and disable airplane/flight mode which will in turn considerably reduce power consumption. This is only necessary if you are trying to save power which is likely to be the case if you are using a solar panel to power the phone.

Warning

I'm told that rooting your phone will invalid any warranty you have on your phone and has the potential render the phone useless.

Setting up

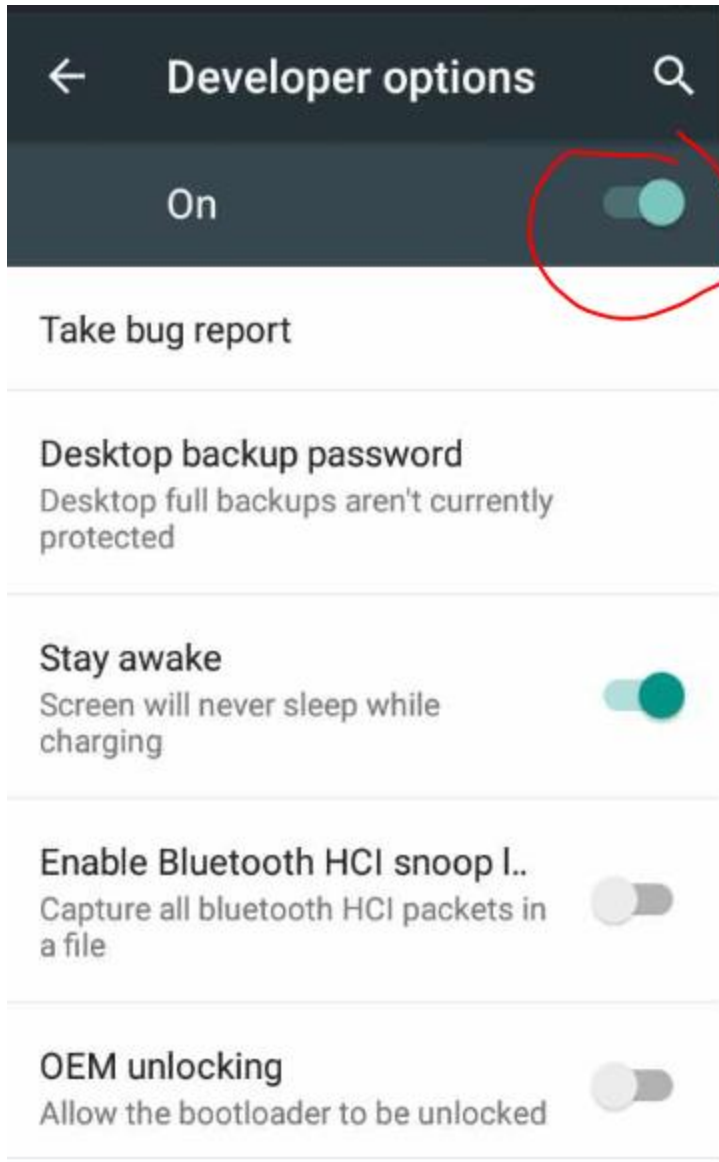
You will need to enable developer mode on you phone. This is done through the phones (not the Cacophonometer App) normal settings. Here are some pretty good instructions (<https://www.digitaltrends.com/mobile/how-to-get-developer-options-on-android/>):

You can unlock the *Developer options* on any Android smartphone or tablet by locating the *Build number* in your *Settings* menu and tapping it multiple times. However, the exact location of the aforementioned build number may differ depending on your phone's manufacturer.

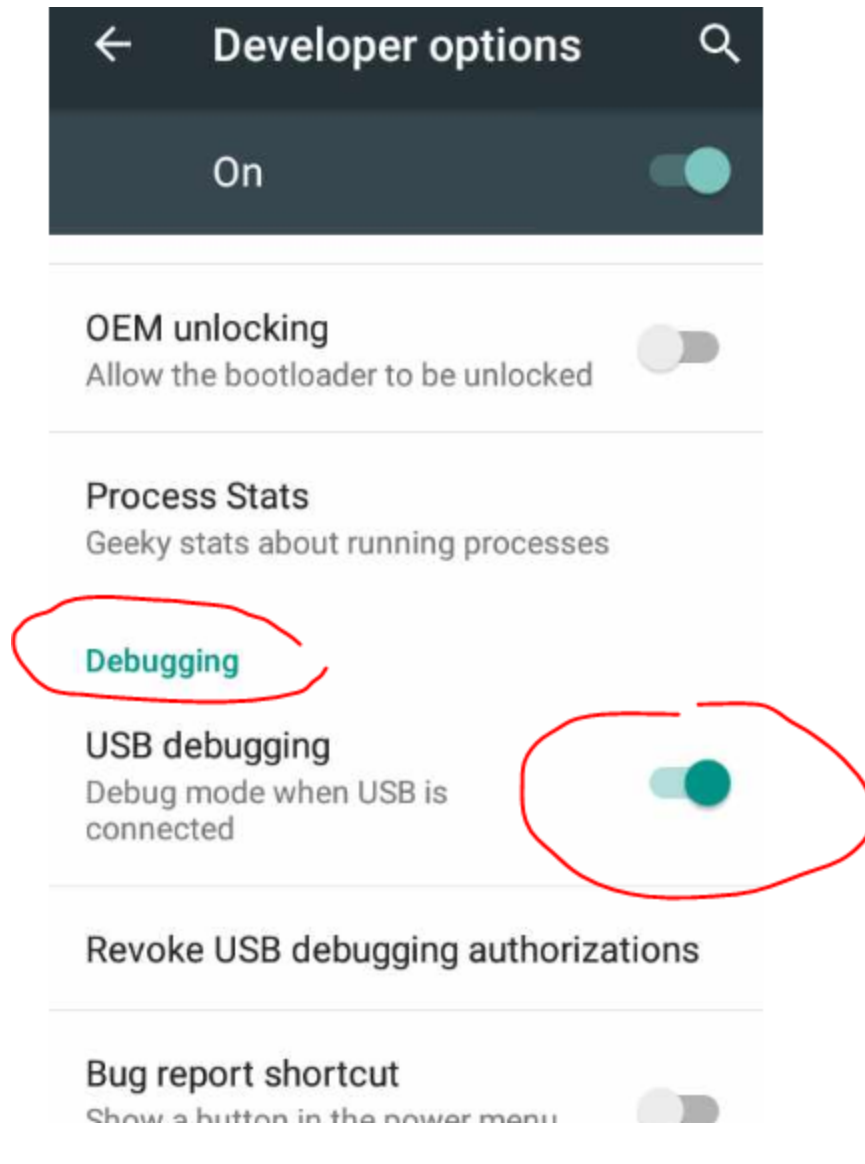
1. If using stock Android, go to *Settings > About phone > Build number*. On a **Samsung Galaxy** device, go to *Settings > About device > Build number*. On an HTC device, go to *Settings > About > Software information > More > Build number*. On an LG device, go to *Settings > About phone > Software info > Build number*.
2. Tap *Build number* seven times. After the first few taps, you should see the steps counting down until you unlock the developer options. Once activated, you will see a message that reads, "You are now a developer!"
3. Go back to *Settings*, where you'll find a *Developer options* entry in the menu.

From <https://www.digitaltrends.com/mobile/how-to-get-developer-options-on-android/>

Once you have access to Developer Options, open Developer Options and turn on.



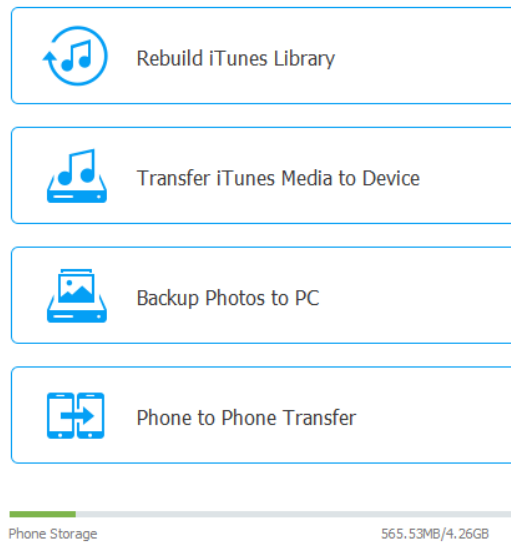
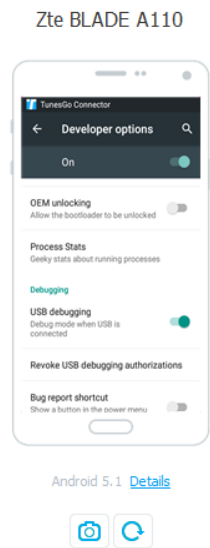
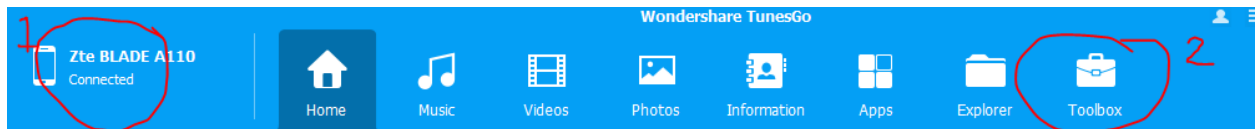
Still in Developer options, scroll down to USB debugging and enable:



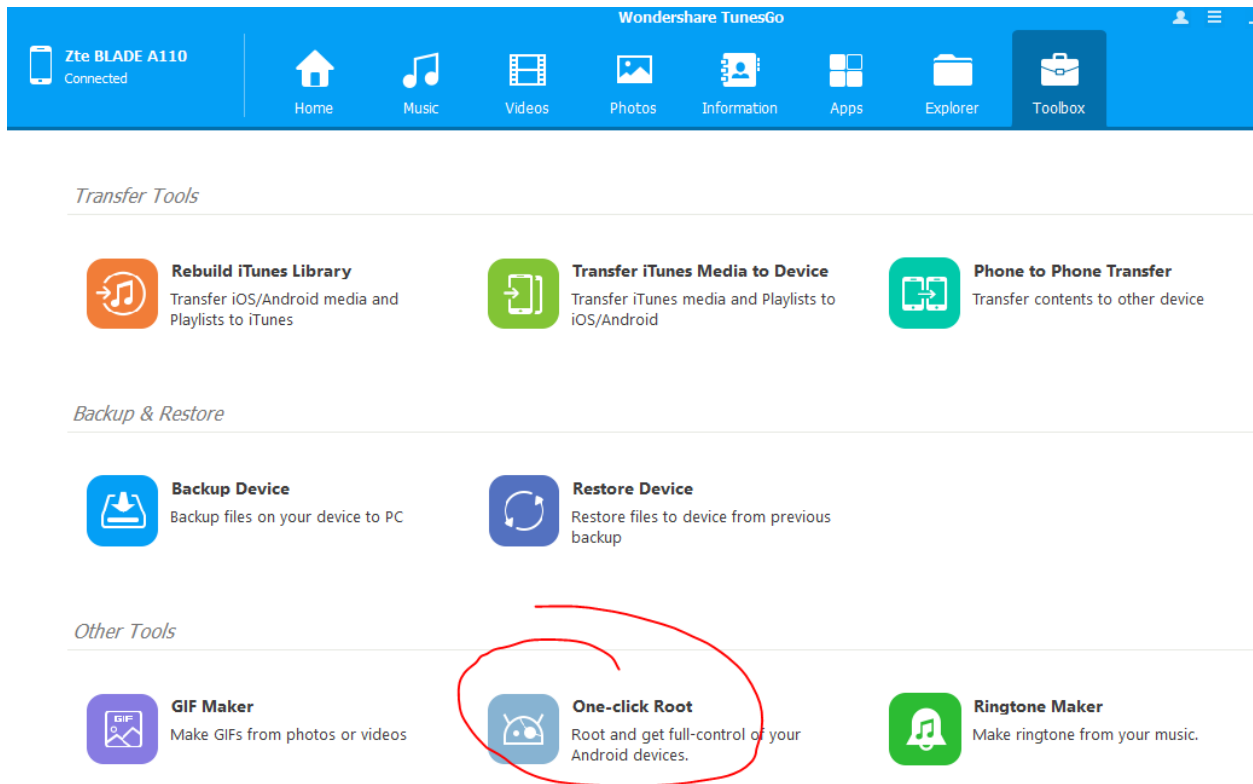
Novice guide to rooting a phone.

Obtain a copy of TunesGo by Wondershare (<https://tunesgo.wondershare.com/>). I've used this on a PC with great success on the 'reference' phone mentioned at the start of this guide, and many other phones too.

Connect the phone and with a usb cable, open TunesGo and confirm that it has successfully connected to your phone (see circle 1 in image below):

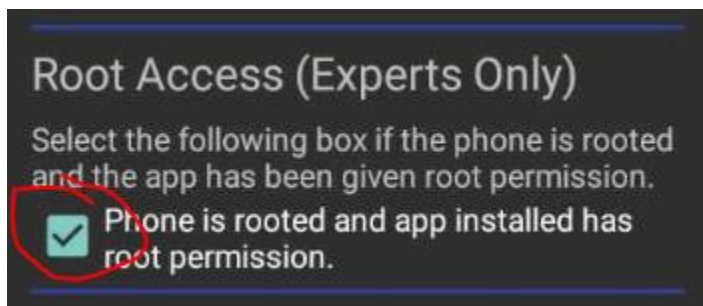


Then select the Toolbox icon (circle 2) in image above, and then press 'One-click Root' as shown in image below:

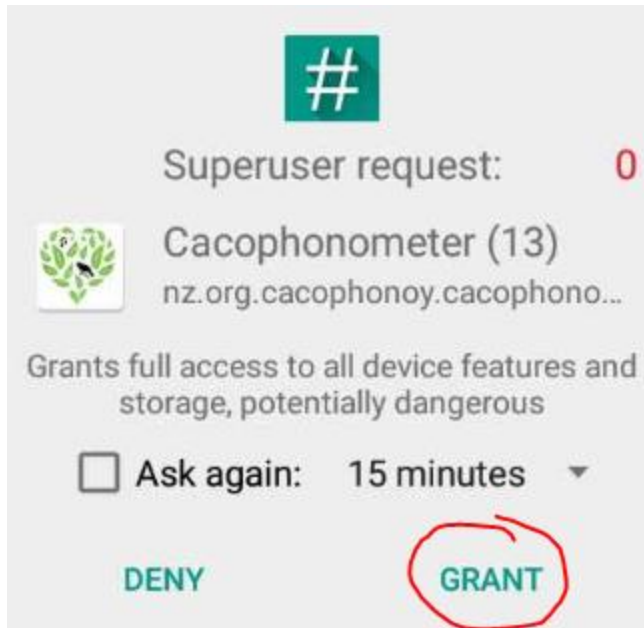


Let the software do its thing and you should get a message saying the phone has been rooted. If it doesn't work, it may be that it cannot root your brand of phone/OS. There are many other options to try but you are about to go down the rabbit hole.....

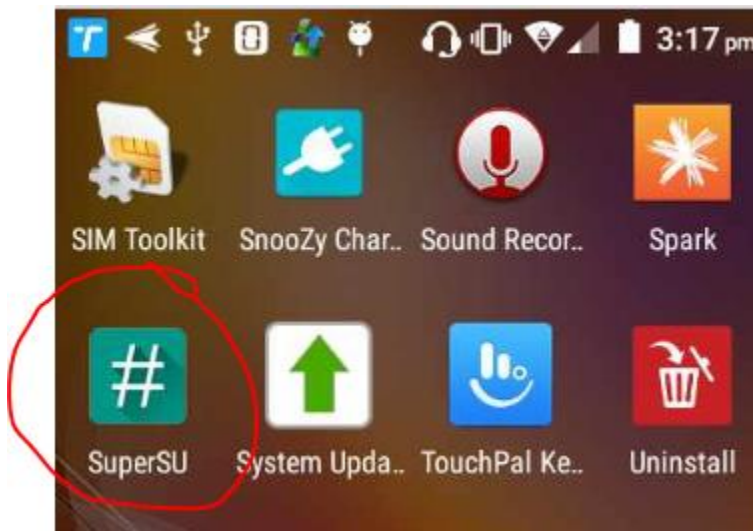
You can now select the Root Access option in the Cacophonometer apps settings:



When the Cacophonometer app first tries to enable or disable airplane you will see a 'Superuser request' – Press the GRANT option:



You should also see an app called SuperSU on your phone:



Open SuperSU and you should see that the Cacophonmter App has 'Grant' access.

11. Solar Panel

If mains power is not available, it is possible to run the phone using a solar panel if you have access to a sunny location. Trials have been done with both 7 watt and 60 watt panels. The 7 watt panel proved to be marginal in it's ability to keep the phone powered through short overcast winter days. The 60 watt panel purchased from Aliexpress (<https://www.aliexpress.com/item/Suaoki-60W-Solar-Panel-5V-USB-and-18V-DC-Output-Portable-Foldable-Power-Bank-SunPower-Solar/32831254385.html?spm=a2g0s.13010208.99999999.262.30453c00VmAqEW>) has proved to be very capable of keeping the phone charged to greater than 90% at all times through night and day, summer and winter. Cost NZ\$170.00

Further trials might show that a cheaper, lower rating panel will also be sufficient.



Solar Panel setup

If you have the solar panel described in these instructions (and pictured here), you can insert the Cacophonometer in the pocket of the panel. You can also see the microphone protruding from the weather proof box, and the use of a stretchy cord to hold the box in place.

The picture on the left shows the panel tied to a tree (the Cacophonometer box cannot be seen as it is the pocket behind the lower section).

Further power saving

If you are using a solar panel it is worth looking at further power saving options.

Turn off Bluetooth

Check that Bluetooth is off in your phone's settings.

Screen display

Set the screen brightness level to the minimum.

Set the screen timeout to the minimum possible – 15 seconds on the reference phone. On some phones the minimum timeout is much longer and if that is the case you can install an app called Snoozy from <http://snoozy.mudar.ca/> Set the Screen lock delay to 'Immediately'.

Do not setup Google account

Do not setup (and remove if you have) any Google accounts on your phone.

Remove unwanted apps

It is likely that there are apps on your phone that might be consuming power. You can use the app called 'System app remover' available from: <https://www.apkmirror.com/apk/jumobile/system-app-remover-root/system-app-remover-root-3-6-2019-release/system-app-remover-root-3-6-2019-android-apk-download/> I have successfully disabled the following apps on the reference phone:

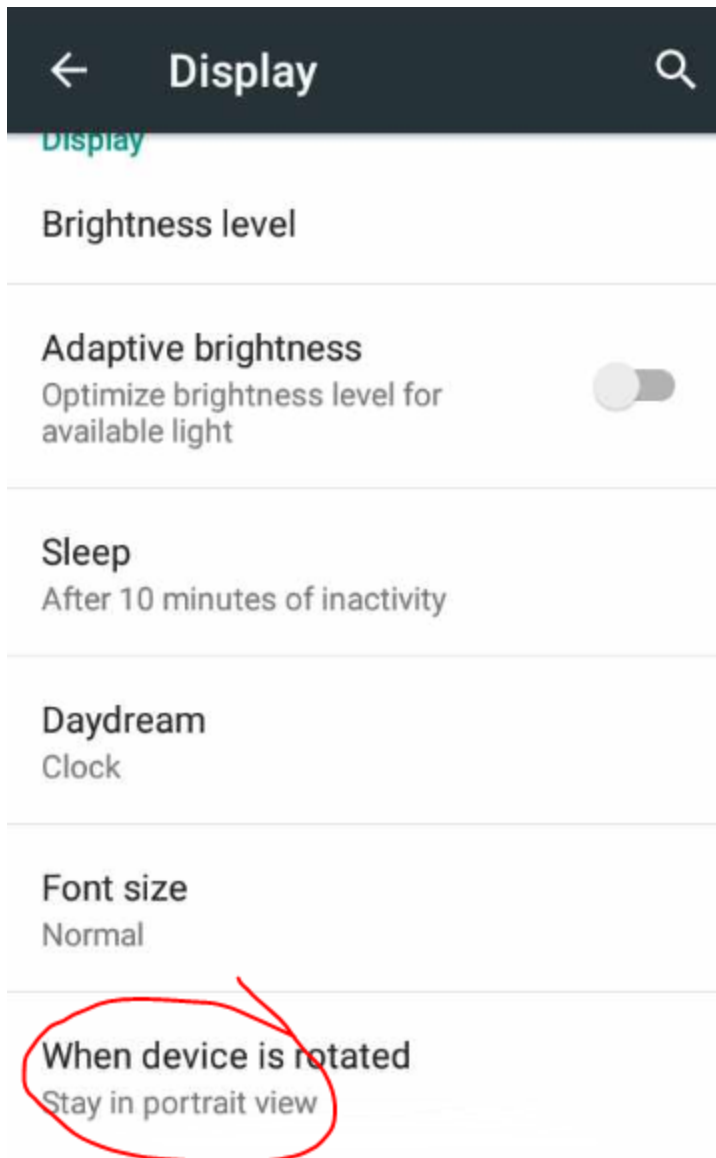
Bubbles, Calculator, Calendar, Calendar Storage, Chrome, Drive, Email, Exchange Services, Gallery, Gmail, Google App, Google Calendar Sync, Google Contacts Sync, Google Partner Setup, Google Play Movies, Google Play Music, Google Play Services, Google Play Store, HTML Viewer, Maps, Market Feedback Agent, Music, Music Visualization Wallpapers, MusicFX, Phase Beam, Photos, Photo Screensavers, YouTube, WPS Office, Y! TWorld, YouTube

12. Remote access (e.g. AirDroid)

There may be the situation where you wish to remotely access the phone. I have successfully used AirDroid to do this – available from <https://www.airdroid.com/>

Setup

- In the Cacophonometer App select the 'Normal Mode (But keep internet connection on)', or select the Off mode, and in the settings choose 'Online Mode'. If you don't do this, you will lose connection if the app automatically enables airplane/flight mode.
- In the phones settings | Display options, choose 'When device is rotated' – Stay in portrait view. Otherwise it is really hard using the phone screen on its side.



In the AirDroid software:

Use the same account as you used when you registered on the website.

- Me|Settings|General
 - Enter a suitable name for device
 - Remote wake-up – on (default)
 - Power saving mode - off
 - Dim Screen when AirMirror starts - on
 - Keep screen awake – off
 - Remote Transfer – Always allow
 - Check automatically - off
- Me|Settings| Connection alerts
 - Play a sound when connected – off (assuming you have a 'Premium' account)

- Tools|Find Phone|Turn on

[Additional apps to install to help with AirDroid](#)

When using AirDroid, you are likely to need to reboot the device remotely and have AirDroid automatically start-up so you can reconnect.

- Download Auto Start_2.2.apk from <https://www.androiddrawer.com/25881/download-autostart-no-root-app-apk/>
 - Install and configure to start AirDroid.
- Download Holo Reboot from <https://apkpure.com/holo-reboot-root/com.scartech.holoreboot>
 - Install (no configuration necessary).
 - Test you can use Holo Reboot to reboot the device.

Reboot phone for AirDroid settings to take effect. You should be get a 'Superuser request' – Press the Grant option.

Test, test, test that AirDroid works before you deploy at a remote location (☺)

Tim Hunt

tim.hunt@wintec.ac.nz

1 August 2018

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Cacophonometer Setup Instructions v4.docx